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OF

HOME ECONOMICS

A COMPLETE HOME-STUDY COURSE

ON THE NEW PROFESSION OF HOME-MAKING AND ART OF RIGHT LIVING;
THE PRACTICAL APPLICATION OF THE MOST RECENT ADVANCES
IN THE ARTS AND SCIENCES TO HOME AND HEALTH

PREPARED BY TEACHERS OF RECOGNIZED AUTHORITY

FOR HOME MAKERS, MOTHERS, TEACHERS, PHYSICIANS, NURSES, DIETITIANS,
PROFESSIONAL HOUSE MANAGERS, AND ALL INTERESTED
IN HOME, HEALTH, ECONOMY AND CHILDREN

TWELVE VOLUMES

NEARLY THREE THOUSAND PAGES, ONE THOUSAND ILLUSTRATIONS
TESTED BY USE IN CORRESPONDENCE INSTRUCTION
REVISED AND SUPPLEMENTED

CHICAGO
AMERICAN SCHOOL OF HOME ECONOMICS
1907

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AN INDIAN BABY

Takima Papoose

CARE OF CHILDREN

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AMERICAN SCHOOL OF HOME ECONOMICS

CHICAGO

January 1, 1907.

My dear Madam:

In my private practice I meet so many mothers, well educated otherwise, who are profoundly ignorant of the care of children that it is a pleasure to find one who is willing to study something of the subject in a systematic way.

The feeding of children, especially of bottle babies, calls for the utmost skill of the trained physician, while the responsibility of a sick child is too great for any mother or nurse.

It goes without saying that a subject which oft times taxes the knowledge of experienced physicians cannot be mastered in a few short lessons by the average mother. It is only in the hope that some of the fundamental principles embodied herein may be impressed upon the student mother's mind and lead to a better appreciation of the importance of details in the management of the child that these lessons are offered.

Children are not alike, nor can they be classified according to their peculiarities with a view to successful care or treatment of their varying disorders. Each child has his particular individuality, study and appreciation of which marks the highest type of the successful physician. The name of the disease or disorder is usually of less importance than the individuality or peculiarity of the child.

The dosing of children according to any stereotyped formula for real or imaginary ail-

ments cannot be too vigorously condemned and the wise mother will rarely administer medicines except under the advice of the physician.

Prevention is always much easier than cure and a mother's greatest opportunity comes in so caring for her child that he may seldom require the services of the physician.

I regret that I shall not be able to give the time to look over your answers personally, but my assistant will call upon me freely and I shall be glad to give any personal assistance that I can.

Very truly yours,

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ONE OF DR. COTTON'S BABIES IN THE "BABY BAG."

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CARE OF CHILDREN

Hygiene of the Baby

Care of the Baby Before Birth

THE care of the infant should begin from the moment of conception. So much does the normal development of the unborn child depend upon the physical vigor and mental balance of the mother that her health during pregnancy is of the highest importance. Everything that tends to improve the mental and physical condition, such as wholesome food, pleasant surroundings, congenial associates, exercise, fresh air and sunshine should be secured for the expectant mother.

Under favorable hygiene even the very delicate woman may bear and nourish healthy children.

Care of the Mother

During pregnancy, especially in the advanced stage, laborious occupation and violent exercise must be avoided. The exercise involved in walking and in the duties of light housework is beneficial while the exertion incident to laundry work, prolonged use of the sewing machine, hill climbing and driving over rough roads may be positively injurious or even dangerous.

Dress

Corsets should be discarded upon the first evidence of conception and loose clothing suspended from the shoulders should be adopted, thus relieving the hips and abdomen of all weight and compression. The ideal dress for this period is the union

A PRINCESS MATERNITY GOWN
Ladies' Home Journal Pattern.

suit, a light petticoat fastened to a loose waist and an empire gown. In cold weather wool tights may be worn instead of additional skirts.

Food for the Mother

The process of making blood and tissue for the unborn as well as for the mother makes heavy demands upon her vital energy, hence not only increased nourishment is necessary but extra sleep, so that a daily nap should be secured unless it interferes with the sleep at night. A liberal supply of substantial but easily digested food should be provided and the appetite, if sluggish, stimulated by outdoor exercise and tempting dishes. Fresh fruits and vegetables in season should form part of the dietary in the absence of which canned vegetables and stewed fruits may be substituted. A heavy diet of meats and rich foods which overtax the digestion should be avoided.

The tendency to constipation at this time may usually be relieved by a generous supply of juicy fruits and the coarser cereals, such as oat meal, corn meal, graham, whole wheat and brown bread.

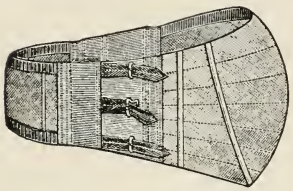
Morning Sickness

The nausea and vomiting (morning sickness) so common during the first months of this interesting condition may occasionally be relieved by a cup of hot coffee or broth taken before rising. Dry magnesia will frequently relieve heart burn (sour stomach) and may act as a mild laxative. If constipation be obstinate a daily enema of from one to three pints of soapy water may be necessary.

Gentle massage of the abdomen with olive oil, cocoa butter or goose fat should be practiced daily, not only for its nutritious effect but to facilitate stretching of the tense skin. If the womb drags heavily upon the abdomen great relief may be obtained by a properly adjusted supporter so arranged as to support the lower part of the abdomen.

The Breasts

The breasts so essential to the future sustenance of the child, should be treated daily to the same gentle massage while the nipples should be gradually toughened by the application of dilute alcohol or equal parts of brandy and water. If flat or depressed the nipples should be developed by moulding with the fingers or drawing out with a cupping glass or breast pump.



AN ABDOMINAL SUPPORTER.
From Griffith.

Swelled feet and distended veins of the legs may be due to pressure of the heavy womb and require frequent rest in the horizontal position with the feet elevated, while the limbs are gently stroked towards the body. In severe cases bandaging may be necessary which, however, should always be done under the advice of the physician.

The Urine

A specimen of the urine should be furnished the doctor from time to time for examination, especially during the later months of pregnancy, as dangerous

kidney complications may be thereby discovered and relieved by timely treatment.

The Teeth

The teeth, which frequently soften and decay during pregnancy, should be put in first class condition by the dentist during the early months, thus preventing much suffering and maybe serious shock.

Mental Conditions

The expectant mother should regard the coming of her baby with feelings of happy anticipation while dread of the ordeal should be kept sedulously in the background. All means for promoting happiness and contentment should be cultivated as despondency, dread and discontent not only interfere with the mother's physical well-being but may tend to arrest or pervert development of the unborn child.

The popular belief in birth marks as a result of disagreeable or unusual occurrences or sights is not well founded, but the hygiene of this period requires that the mother be protected from undue mental strain or intense emotional disturbances.

Preparations

All preparation for the advent of the little one should be simple, rational and complete long before the last weeks of pregnancy thereby avoiding the undue work and worry of hasty preparation.

Importance of Early Care

The pregnant woman should be under the care of a competent physician during the entire period of gestation.

Since not only the life of the infant but his entire

future health is dependent upon the nature of his early care, intelligent study of all that pertains to the hygiene of this little being is the highest duty of the young mother. The belief that instinct endows motherhood with knowledge requisite to her new responsibilities is not only erroneous but productive of great mischief, as the lost or ruined lives of thousands of mismanaged infants will attest.

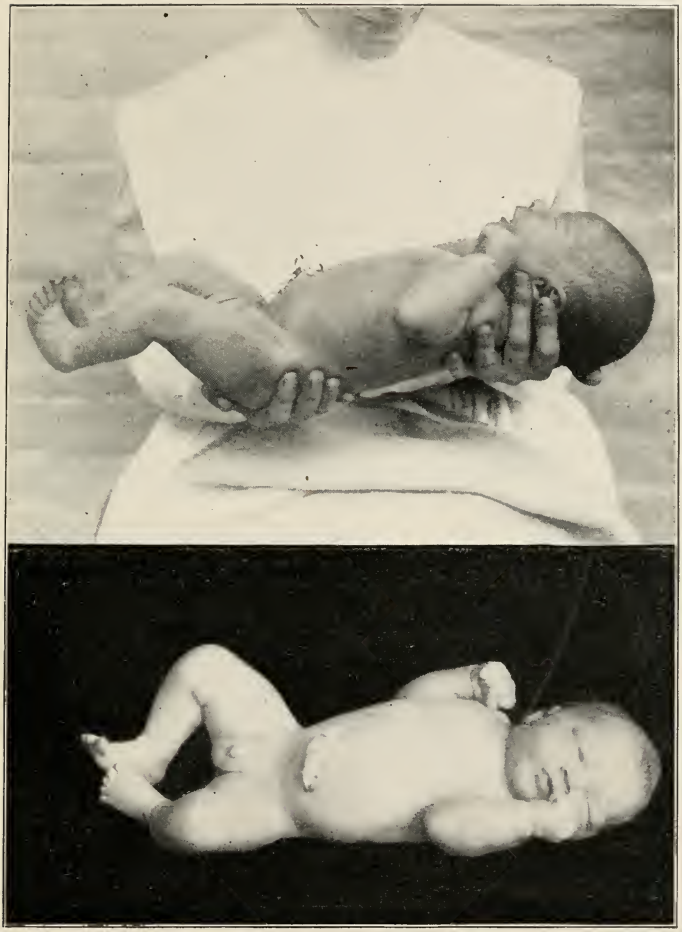
Importance of Infant Hygiene

Viewed in this light a knowledge of the slightest details of the infant's anatomy, physiology and hygiene assumes a new significance and may prove of inestimable value in conserving his health and insuring his normal development. The startling death rate in early infancy calls loudly for a more thorough study of the causes of poor development and disease most of which might be prevented by a better understanding of the infant and his requirements. It is evident that the simplest method of studying the new born infant is to become familiar with the details of his normal form and proportions, for in this way only may departures from the normal be recognized.

THE NEW BORN BABY

Skin

The infant's skin at birth is usually covered with a thick whitish substance (vernix caseosa) which is most abundant in the creases and depressions and upon the scalp. At birth the color is a dusky hue, which after a few full inspirations changes to the



TWO NEW BORN BABIES

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"boiled lobster" red. About the third day a scaling of the skin begins, which continues for a week or ten days. The texture of the skin is very delicate and is usually covered with a downy growth, called lanugo.

Weight

The average weight at birth is about 7 pounds for boys and 6 pounds for girls. The average length is from 18 to 20 inches.

Proportions

To anyone seeing a new-born infant for the first time, the large head, small chest, enormous abdomen and insignificant extremities seem out of all proportion.

A constant proportional relationship exists between the different members of the normal infant at birth. The following simple rule will aid the student in remembering this relationship.

Rule.—Add 4 inches to half the baby's length for the chest circumference; the head is one inch larger than the chest. The abdomen is ½ to 1 inch larger than the head, e. g.:

Length	18 inches
Circumference of thorax	13 inches
Circumference of head	14 inches
Circumference of abdomen	14½ inches

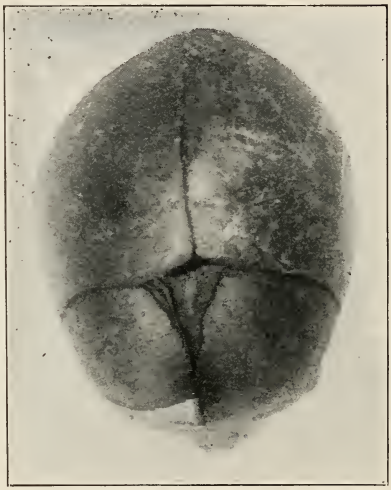
The Head

The head, being plastic, shows the pressure effects of recent birth. If labor has been prolonged it sometimes presents a great elongation and not infrequently there is a soft doughy swelling as large as half an orange near the crown caused by the

recent pressure. By the end of the first week the head should have resumed its normal shape.

Fontanelles

Adjacent margins of the bones of the head are separated by fibrous tissue continuous with the lin-



SKULL OF AN INFANT, SHOWING FONTANELLES.

ing internally and the covering externally. At the places where three or more bones should come together are soft spaces called fontanelles. The largest and most important of these is situated at the top of the head well to the front, and is often called the "soft spot". In this space there is a regular pulsation corresponding in frequency with the heart

beats. The fontanelles should be carefully guarded against injury.

Bones

The softness and elasticity of the bones of infancy are due to their vascularity, the sponginess of their texture, and from the layers of cartilage and membrane not yet ossified.

The true bony structure of the new born baby corresponds to the needs of the infant, e. g., the bones of the lower jaw and ribs and collar bone which renders possible respiration and suction from birth, are well developed.

Sucking Cushions

Over the cheek muscles, in addition to the ordinary layer of fat, there is an arrangement of fatty lobules on either side, called "sucking cushions" because they prevent the cheeks being pressed inward between the jaws when nursing.

The Eyes

The eye at birth is anatomically incomplete, which would prevent perfect sight even if the brain were ready to receive and interpret impressions. The color of the iris is a bluish gray and the pupils are large and sensitive to light.

The lachrymal glands are not fully developed, hence no tears before the third month.

The nose is relatively small, and the respiratory portion is very small.

The tongue is rarely the seat of congenital defect and tongue tied babies are not often seen.

The Spine

The spine of the infant is extremely flexible. It is, in fact, almost wholly cartilaginous at birth, the

centers of ossification being present but the process only slightly advanced.

The collar bone is the first bone of the skeleton to ossify and is more frequently fractured during delivery and in early childhood than is any other bone.

The Lungs

Rapid and remarkable changes occur in the lungs after birth. During the first inspiration comparatively little air is taken into the lungs but as one full inspiration follows another, inflation increases more and more until full distension is accomplished after which the lungs are never completely emptied of air during life.

Blood Supply

Growth and action of all the organs are entirely dependant on the blood supply. As the blood supply not infrequently depends upon the muscular activity of the parts, it is plain that restrained activity or interference with circulation by any means retards both function and growth. In the care of the young infant too much stress can not be laid upon the importance of freedom of motion for all the members, and avoidance of anything that tends to compress the vessels, such as long continued lying in one position, with possibly the addition of blood stagnation in the dependent parts. In this respect, also, the clothing requires that no bands nor seams may press upon the vessels of ditribution or the return supply of blood.

Respiration

From birth to death the oxygen necessary for the vitality of the body is supplied through the air

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vesicles of the lungs. If any vital process is pre-eminent in its importance, it is that of respiration. Young children inhale more oxygen and exhale more carbon dioxide, relatively, than adults. This is a result of the more rapid tissue change in the growing organism.

As respiration begins only after birth it is probably the least developed of the vital functions. Its want of vigor is partly due to compressibility of the chest walls, to the lack of full development of the respiratory muscles and partly to the narrowness of the upper air passages. Care of the nose and throat is necessary to prevent accumulations or growths which interfere with the free entrance of air.

The average rate of respiration is from 30 to 60 per minute and during the early months may be very irregular.

Chest

The yielding character of the chest renders the baby very susceptible to disturbances by compression, so that great care should be exercised not only in the handling of the infant but also in the clothing so that no constriction of the chest be allowed.

The glands of the mouth of the new born secrete mucus which serves for protection. The salivary secretion is established but feebly and possesses little, if any, power of changing starch to sugar.

Digestive Organs

The stomach at birth secretes pepsin in very small quantity and at this early age is more of a

receptacle for food than a digestive organ. Coagulation of milk by the rennet ferment represents nearly the whole extent of its digestive function.

Shortly after birth meconium (a viscid, tarry, odorless substance) is discharged from the bowels. This continues until the feces are changed to a canary yellow by the taking of milk.

Urine is normally present in the bladder at birth and is usually voided within a short time, any delay beyond twelve hours causing some anxiety. The urine should be pale and odorless but it may contain uric acid crystals which stain the diaper like iron rust and are sometimes so abundant as to completely obstruct the small tubes of the kidneys. This uric acid is a frequent cause of colic in the new born.

Care of the Skin

The delicate skin of the infant demands constant care to prevent irritation and excoriations especially about the buttocks, from the urine and feces. It seems hardly necessary to remark that the diaper should always be removed as soon as it is wet or soiled and should never be used the second time without thorough washing.

Nervous System

In regard to the functions of the nervous system it may be said that at birth the infant is merely a bundle of reflexes. Such reflex action however as respiration, swallowing, winking, coughing, sneezing, clinging, etc., shows a remarkable pre-natal development of mechanism.

Special Senses

The sense of hearing is probably not present at birth, but is established within the first day or two, as the middle ear fills with air and the congestion of its mucous membrane subsides.

In all probability smell is the last of the special senses to develop.

The sense of taste is evidently well developed from birth, the young infant readily distinguishing milk from water.

Tactile sensation is very acute in the lips, tongue and eyes, although feebly developed in other areas.

CARE OF THE NEW BABY

The newborn is entirely at the mercy of his surroundings. In fact, of all the mammalia, the human infant is the most helpless.

First Cleansing

Immediately upon delivery the baby should be wrapped in a warm soft shawl or blanket. The eyes, mouth and nose should be thoroughly cleansed of secretions by the gentle application of sterilized gauze or cheesecloth dipped in tepid boric acid solution. A saturated solution of boric acid in boiling water, carefully strained, cooled and bottled should be a part of the equipment of the confinement room and nursery; also a supply of sterilized gauze or cheesecloth cut in three-inch squares and kept in sterilized wrapping. To sterilize the cheesecloth or gauze it should be kept in boiling water for forty minutes, dried in an oven and at once wrapped in a sterilized cloth or wrapping.

Care of Eyes

The eyes should be cleansed with separate pieces of gauze moistened with the boric solution by pouring from the bottle. If a few drops of the solution find their way between the lids so much the better.

The mouth may be freed of mucus by wrapping the finger in dry sterilized gauze and gently wiping out the secretion, after which the mouth should be washed with the boric acid solution. Then it is well to give the baby a teaspoonful or two of pure tepid water.

Gentleness

If necessary to free the nose from secretions it may be done by gently squeezing it between the thumb and finger from the top down, after which the solution should be applied on a piece of twisted gauze. Extreme gentleness must be observed in these manipulations so as to leave no wound or abrasion upon the delicate tissues which may give entrance to infective germs. The nurse's hands and nails should be cleansed beyond suspicion.

Care of the Cord

The cord may be freely dusted with pulverized boric acid and covered with dry absorbent cotton. Placing the baby on the right side favors the new course of blood through the heart.

The vernix caseosa with which the new born baby is usually covered is best removed by a thorough rubbing with warm olive oil, or fresh lard, which forms with it a soft lather and is easily removed by gentle wiping with dry soft gauze. The next day's oiling and wiping will remove from the creases and folds what

little of the substance may have escaped the first cleansing.

First Bath

On the question of the first bath there is a decided difference of opinion. Considering the temperature from which the new comer has emerged (100° F.), the transition to room temperature even, 78° F. would seem to be sufficiently stimulating. There is a growing opinion in favor of delaying the bath, and the writer believes with others that this first water bath should not be given for several days after birth. A daily rubbing with warm olive oil is to be preferred as affording less danger of shock.

The baby's brief toilet completed, the dressed navel supported by a light flannel band, he should be wrapped in a fresh dry blanket and allowed to sleep in a warm, dark, quiet place for three hours, after which he may be given another drink of pure water.

First Nursing

It is advisable to place the infant at the breast within a few hours after birth as it is believed that the colostrum or first milk secreted is adapted to the needs of the infant's digestive tract. The mother's nipples and the baby's mouth should be previously cleansed with boric acid solution.

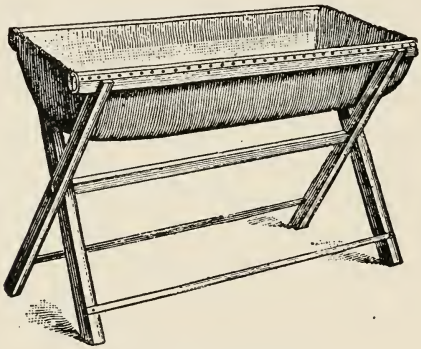
Imperative Needs

An infant's needs are few but imperative. They are *warmth*, *food* and *repose*. It should be disturbed only when necessary for drink, for its daily baths, change of clothing, or for fresh diapers. It should be nursed every two hours during the day and once at night,

The child should not sleep with the mother or nurse, but in its own crib or basket from the first.

Shock

Too much stress cannot be laid upon the avoidance of all that tends to shock or fatigue, and the observance of absolutely antiseptic details. Could nurses and mothers realize the need of absolute rest for the new born, the advent of the baby would not be the signal for the "rough house" procedures so frequently seen,



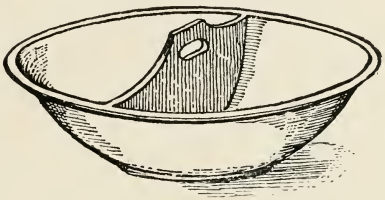
A RUBBER BATH TUB.

in the bath attended by admiring relatives, the dressing in unsuitable garments, and the frequent exhibitions of the baby to delighted neighbors and caressing friends.

First General Water Bath

The first general water bath may be given to vigorous babies the fifth or sixth day, after which it may be a part of the daily toilet. In cases of premature or very feeble infants the tub bath should be postponed until there is no danger from shock or chill. The early

bathing should be done with the baby on the nurse's lap, protected from drafts by a soft blanket. Each part should be gently bathed with a cheese cloth sponge and quickly dried by patting with a dry, warm towel of the same material. New cheese cloth for this purpose may be rendered absorbent by thorough boiling in soda water, followed by careful rinsing. The animal sponges should not be used as they cannot be properly cleansed and quickly become breeding places for germs of many kinds. A full tub bath should not be given until the cord has come off.



A Double Ewer for Hot and Cold Water.

Soap

A good quality of castile soap is probably the best to use, for many of the so-called "baby soaps" are too irritating for the infant's delicate skin. After drying the creases may be lightly dusted with a reliable baby powder, using a box with a finely perforated top for this purpose. The ordinary puff ball and powder box should not be used because they are so easily contaminated with dust laden with bacteria.

Care of the Scalp

Unremittent care is required to prevent accumulations on the scalp. If crusts are once formed they must be softened by frequent applications of warm oil.

They should never be removed by use of the fine tooth comb, in fact a comb should not touch the baby's scalp during the early months and strong soap and friction must be avoided in the removal of the accumulations.

Temperature

The sensitiveness of infants to heat and cold is not surprising when we consider the conditions, viz., the relatively large radiating surface of the body (50 per cent more than the adult), the thinness of the skin, the distensibility of its blood vessels, and the undeveloped state of the heat regulating centers. The normal body heat is highest in the afternoon and the lowest from 12 to 4 a. m. Rectal temperature, as a rule, is the only reliable one, as in the young infant the mouth can not be utilized for that purpose, and the surface of the body, for reasons above stated, shows a temperature two or three degrees lower than that of the blood.

THE BABY'S CLOTHES

Weight and Texture

In the care of the baby uniformity of the surrounding temperature should be maintained and the child protected from excessive radiation by clothing. Nothing is more appropriate for this purpose than wool and as lightness is desired two thicknesses are better than one containing the same amount of material. Simply made clothing without elaborate ornamentation and trimming designed for the baby's comfort shows better taste in the mother.

Freedom from Restraint

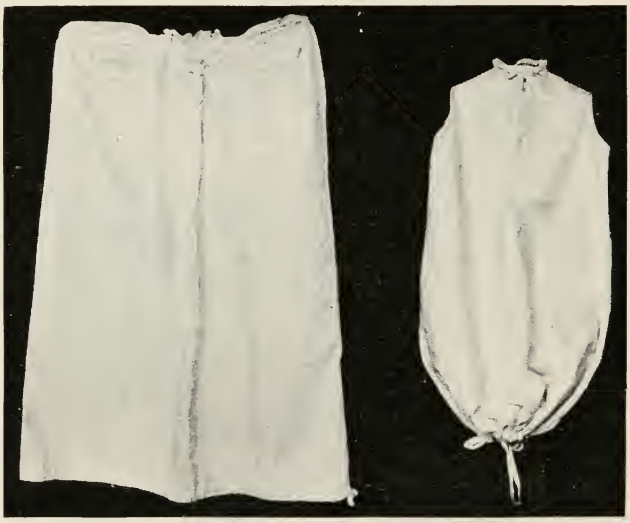
The clothing should not interfere with freedom of muscular movement or blood circulation. This means that it should permit unrestrained freedom of move-

BABY CLOTHED IN A SLEEVELESS SACK OR "BABY BAG."

ment of all the muscular structures, whether toes, fingers, feet, hands, legs, arms, abdomen, back or chest. The evils of the old fashioned pinning blanket, the tightly drawn diaper, as well as bands about the chest

and abdomen, and any tapes or strings which restrict the circulation should be apparent.

Since the object of clothing for the infant is to secure uniform temperature the writer can conceive of no reason why one portion of the body requires heavier clothing than another, hence material of uniform thickness is required for trunk and limbs.

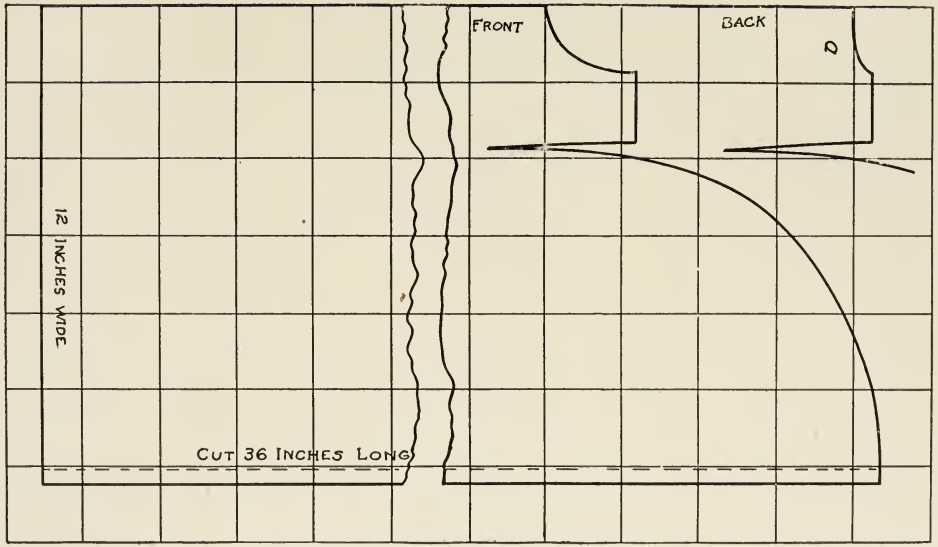


OUTER AND INNER GARMENT OF THE SLEEVELESS SACK.

Inner garment shown closed at bottom with the draw string; outer garment opens. Both garments are fastened at the neck *in front* with safety pins.

The Baby Bag

The ideal protection would seem to be afforded by a sack of light, flexible, nonconducting material, so constructed that it envelops loosely the entire body, closed



PATTERN OF DR. COTTON'S "BABY BAG."

To make pattern, draw parallel lines making 2 inch squares on a piece of paper over 36 inches in length and 12 inches wide. Then draw the outline as above. The pattern for the back is the same as for the front except at the neck *a*. The cloth is folded and cut double, the seams being at the side. It is gathered along the curved lines to give room for the arms. The opening is in front.

above by safety pins, below by a draw string. Such an arrangement was designed by the author and has been successfully used in a number of hospitals in this country and abroad as well as in private homes. There is good reason for including the hands in the covering as a prevention of the habit of putting the fingers in the mouth. This is a most unhygienic practice, first because it favors introduction of infections; second, because the subsequent chilling of the parts from rapid evaporation of moisture induces local congestions, causing symptoms of indigestion, colic, etc. The author believes that the hands should be included in the outer garment for the first five or six weeks of life after which time the bag may be replaced by the usual white nainsook or muslin slip.

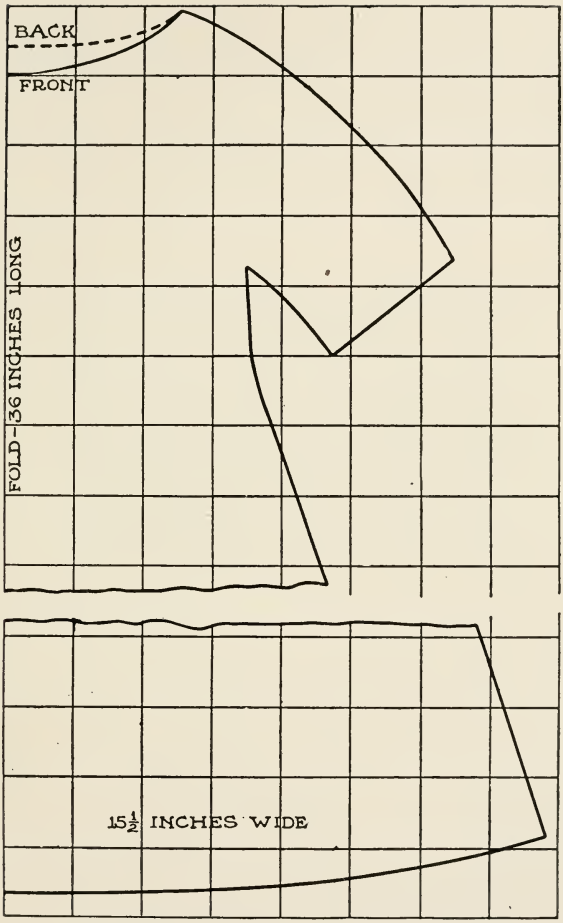
Night Garment

The bag will then serve as an ideal night garment for the first six months, and then the combination night drawers with feet are recommended because with these the lower extremities cannot be entirely uncovered. An entire change of clothing should always be made for the night.

When necessary under the sack, additional protection against cold is afforded by separate under garments, as a light knitted shirt of silk and wool and a sleeveless slip of baby flannel.

Under Clothes

The best under garment for a baby is the knitted long sleeved shirt of mixed lamb's wool and silk. This shrinks less and is less apt to be irritating to the skin than all wool, and is warmer than the all silk. The same material, or a mixture of wool and cotton, is suit-



PATTERN FOR A SIMPLE MUSLIN SLIP.

Draw 2-inch squares on a paper over 36 in. x 16 in. and sketch the pattern as indicated. The gown is gathered at the neck and wrists on very narrow bands. The back is like the front except at the neck. (Only the top and bottom of the pattern is shown.)

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able for the stockings, which should be long enough to pin to the diaper, which in turn is pinned to the shirt, thus leaving no portion of the child uncovered. No socks or bootees are needed. Over this the baby bag as described furnishes all the clothing necessary for moderately warm weather.

A KNITWEAR INFANT SHIRT.

In Winter

In winter, or where the baby cannot be protected from drafts, an additional garment without sleeves, reaching from the neck to ten or twelve inches below the feet, may be used next the shirt. Some mothers prefer to close this garment with a draw string, leaving the outer garment open and long enough to conceal the draw string effect of the skirt.

Material

Scotch flannel in its various dainty shades and patterns is excellent unshrinkable material for the bag, while soft, white baby flannel is suitable for the intermediate garment. No other clothing is necessary for

the first few weeks, unless a light shawl or quilt for carrying the baby from room to room, and a light silk scarf for occasional use to protect the head from possible drafts.

"THE FIRST LAYER."
Diaper fastened to the shirt, and stockings with safety pins.

The Diaper

The diaper should be light with no more material than is absolutely necessary for the absorption of the discharges. Absorbent cotton, loose or in pads, preferably the latter, retained by a loose cheesecloth diaper, which is secured to the shirt by safety pins in

front and behind, has been found to meet all requirements. Where economy prohibits the use of absorbent cotton (which must be destroyed when soiled) a square of folded cheesecloth which can be washed may be substituted.

No mention is made of the belly band for the reason that in the writer's opinion none is needed after the dropping of the cord until which time the cord dressing should be retained by a bias band of unhemmed flannel. This should be from three to four inches wide and about twenty-four inches long. Small safety pins may be used for fastening.

No Belly Band

In dressing the child, its head and neck should always be supported by the hand or arm of the nurse. The weight of the young infant should never be allowed upon the unsupported spine as in the sitting posture, until five months, even in rugged children, and then only for a short time. Much harm results from too early use of the high chair and modern perambulator.

Care in Dressing

SHORT CLOTHES

Since all clothing limits to a certain extent the freedom of movement so essential to nutrition and growth, the shortening of garments is obviously a gain in the child's hygiene. The careful mother will be governed by the vigor of the child and its surroundings as well as the season in the matter of shortening its clothes.

Time Dependent on Climate

The first short clothes need differ in no material respect from the long clothes except in the length of the skirts.

Waist and Drawers

When diapers are no longer necessary short knitted drawers are substituted, which, with the stocking supporters, are attached to a waist. In winter the waist should be of flannel, with or without sleeves, and the drawers of wool extending to the ankle.

Foot Covering

The shortening of the skirts necessitates extra protection for the feet. Before the creeping time the knitted shoes without soles should be used. Later the more durable kid or chamois moccasins are necessary. Unwittingly, great cruelty is practiced in the conventional baby foot covering.

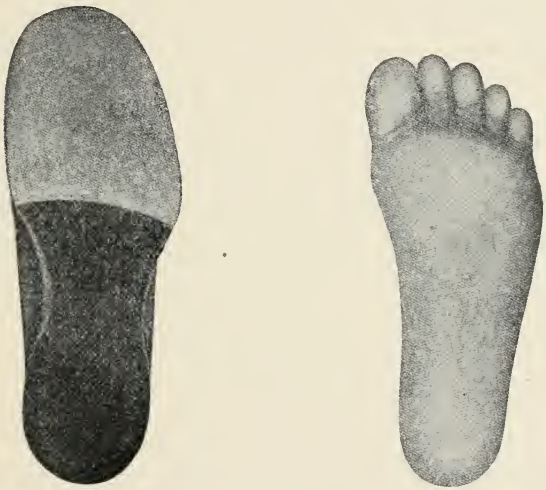
Most of the prevailing deformities seen in the civilized foot have their origin in infancy at a time when the rapid growth of this plastic member is easily retarded or perverted by the slightest degree of persistent pressure, as from a too short or too narrow stocking. Chalk the sole of the baby's foot and press it against a damp slate or hard black surface and compare the impression with the outline of the ordinary baby shoes sold in the shops.

Moccasin Shoe

The rapid growth necessitates frequent renewal of the moccasin shoe, which should be made for the feet, respectively, rights and lefts. They should fit the foot firmly only about the ankle and instep leaving ample room for the elongation and spreading of the toes. To secure proper adjustment shoes should be laced rather than buttoned.

In learning to walk all the separate muscles must be educated to act in unison, hence every part of the foot

and its toes must be allowed the utmost freedom. A snug shoe deprives some of these muscles of their opportunity for education by binding the parts together to act as a unit instead of in unison. A stiff, unyielding sole interferes with the foot grasp of the ground.



SHAPE OF CHILD'S FOOT AND PROPERLY SHAPED SHOE.

As well might the child be taught to play the piano with hands encased in husking gloves as to attempt to gain perfect control of locomotion in the modern shoe. Hard shoe soles, like ancient sandals, are merely the outgrowth of the necessities of travel and have no place in the hygiene of infancy.

No Bands

Since vital capacity is best measured by lung expansion anything that interferes in the slightest degree with the movements of the ribs or diaphragm limits by so much vital capacity. A tight band around the abdomen interferes with the normal muscular movements of the stomach and bowels, weakens the abdominal walls and is frequently the cause of rupture both at the navel and groin.

No Constrictions

A constriction around the hips, as from a tight diaper, retards the growth of the pelvis at a time when its substance is mostly cartilaginous and is undoubtedly one of the causes of the prolonged travail so common to American mothers.

CLOTHING FOR OLDER CHILDREN

Proper Protection

As the child grows older its style of dressing necessarily changes but certain facts must still be borne in mind. In the adult more than three-fourths of the heat produced in the body is given off from the surface of the skin. In children the per cent of loss is probably still greater because the proportional surface of the body exposed is larger. One of the important functions of clothing is to regulate the movement of air streaming to and from the surface of the skin so as to retard the exchange of the warm air surrounding the body with the outer atmosphere without preventing it. The material, form and cut of the clothing all have to do with the proper performance of this function.

All vital processes require a certain uniform tem-

perature and interference with these is especially disastrous during the period of rapid growth. All endeavor is made to maintain this for the infant, but it is often overlooked for the child, where the need still remains as great.

Materials

Clothing may become the cause of disease, either because of permitting sudden chilling of the body or because of checking the circulation, respiration or perspiration. The material should be selected with special consideration for the constitution, sex and age of the child; its power of heat regulation, and should be suited to the child's skin as well as so designed that it may permit liberty of movement.

Bare Legs

A word of caution should be given against the prevailing fad of bare legged children. The bare footed country boy, living out of doors all the time, clad only in shirt and trousers, may resist the exposure; but there is danger to the otherwise warmly clad city child. When the stockings are left off and socks and low shoes substituted, for the sake of coolness near home, the custom is permissible; but in our fickle climate, when a change of weather or a thunder storm may lower the temperature from 20 to 40 degrees, there is grave danger of a chill. This disturbs the circulation and may induce digestive disturbances, colds, or serious illness. A child's health should not be endangered by fad or fashion.

Protection

The absolute wants of the infant are few and simple, and may be expressed in the two words—*Protection* and *Food.*

The infant must be protected from shock to which he is peculiarly susceptible. Normal function, as digestion, may be arrested by shock alone. Shock may occur from sudden changes of temperature, from noise, from blows or jars, from unaccustomed motion, from fear or anger, from intense light, and from excessive or prolonged pain.

Protection should be secured from infectious or irritating substances, either internal or external. The baby should not be subjected to rough handling or rough clothing; it should be protected from liability to falls, or from blows especially on the head, and from wounds, scratches, bites or abrasions of any kind. Its surroundings should be as sanitary and antiseptic as possible in all particulars.

THE NURSERY

The multiplicity of these needs, not to mention the necessity of regularity in feeding, bathing, sleeping and so forth demands a systematic regime. Obviously this can best be secured through a separate nursery in which the means to the end are under full control.

The Room

The room selected for this purpose should be in a quiet part of the house and should receive direct sunlight during as much of the day as possible. It should

Furnishing

Temperature

Furniture

le of sufficient size to secure ventilation without noticeable drafts, and furnished with special reference to antisepsis, hence carpetless, except for rugs which may be aired often; curtainless, except for light wash materials; devoid of moldings, pictures or fixtures which invite the lodgment of dust. The walls should be hard finished, preferably painted to permit of thorough cleansing with water or antiseptic applications. Double windows should protect against drafts and diminish direct radiation, and the system of heating and ventilation be under absolute control. The temperature should be from 75° to 80° F. during the first week after which time until the child is three months old about 75° is recommended. After that it may be gradually lowered to 70° or even 65° at night. If the sleeping room be too hot and the rarified air fails to furnish the necessary amount of oxygen the child's vitality is lowered by copious perspiration and his susceptibility to cold taking is increased.

The nursery should preferably not be upon the ground floor, or on a level with the ground. Plumbing of any kind, even the best stationary washstand, should find no place in this room, and it is even better to select a room not having direct connection with the family bathroom, as being more free from possible impure gases.

In fact the room should contain nothing save the furniture necessary for the care of the infant. The metal crib should have a mattress filled with selected

hair, and if any pillow is used it should be a very thin one of the same material. The mattress should be protected by a thin rubber sheet placed *under* a quilted pad, and the covering should be of light wool.

Simple Articles

The different articles necessary in a nursery should be as simple, strong, light and plain as possible. Upholstery is not desirable, and the furniture for the child should be suited to it. That is, the tables, chairs, etc., that it is to use should fit the child not the older person. For the infant a bath tub (flexible rubber preferred), a bath thermometer, wall thermometer, scales, a double ewer, soap dish, on a low table, around which stand a high folding screen, are requirements.

Weighing the Baby.

SLEEP

First Year

A very young baby should sleep about twenty hours out of the twenty-four, in fact all the time when not being nursed, bathed or changed. No definite statement can be made as to the exact number of hours that a babe should sleep at a given age. No error will be made if the child is encouraged to sleep all that he will during the first year, being guarded against all noise and disturbances. Rocking and carrying are advised against as unnecessary and possibly harmful. Certainly the jumping up and down of a tiny infant in the mistaken belief that

its comfort is thus increased is ridiculous and not conducive to the best good of the baby.

The sleep during the first few days is profound, but during the rest of the year it is easily disturbed. The position of the child should be changed during the longest sleep of the night. During the time when the bones of the head are hardening it is necessary to change the position of the baby, putting it first on one side, then on the other, that its head may not exhibit a flattening on one side.

Regularity

It is important to preserve great regularity in the hours of sleeping. No child under six years can afford to forego the daily nap, for which the shoes and outer clothing at least should be removed.

A normal healthy baby with wants satisfied will sleep if comfortable and left alone. The fussy nurse or mother too frequently interferes with this function by over solicitude or mistaken notion that the baby wants companionship. It is better to put it in its crib and if possible go into an adjoining room, to accustom the child from the very beginning to sleeping alone. A few experiences will establish the habit and thus save the mother much time and strength as well as give the child better and more regular sleep. If the habit is fixed early no difficulty will be experienced.

The Soother

The custom of quieting the baby by the use of a blank nipple—"soother"—is not only extremely unsanitary, but is positively injurious. No more efficient means for introducing the ever present disease

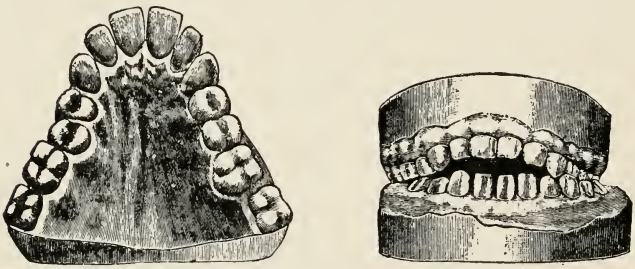
germs into the system could be devised and many a mysterious infection may be explained by this practice.

Thumb Sucking

The habit of thumbsucking, if long continued, very commonly induces changes in the shape of the mouth, teeth and jaws which amount in some cases to a deformity.

Vicious Circle

It is sometimes difficult to secure the necessary amount of sleep for children of active mentality or nervous temperament. Insufficient rest increases this



DEFORMITIES CAUSED BY PROLONGED THUMB SUCKING. (Talbot.)

natural nervousness, which in turn, tends to prevent sleep, thus establishing a "vicious circle" which robs growth, arrests development and finally destroys the child or wrecks his future life.

Disturbed Sleep

The causes of disturbed sleep are so numerous and intricate that a brief enumeration of those most apparent must suffice.

Besides the physical discomforts due to bed or clothing, insect bites, soiled diapers, constipation, skin irritations, excess of heat or cold, the child may suffer pain arising from internal conditions, such as earache, headache, intestinal disturbance, kidney colic, rheumatism (growing pains), sore mouth, or feverish conditions from various infections to which he is especially subject. Sleep disturbance is frequently due to interference with respiration from catarrh of the nose or adenoid growths in the naso-pharynx or enlarged tonsils. Here, also, may be mentioned worms, intestinal or rectal, and disorders of the genitals.

The most common cause of restlessness, however, is indigestion due to improper food or methods of feeding.

EXERCISE

Crying, Kicking, Etc.

Exercise is absolutely essential to the normal growth and development of all the muscular structures. Lusty crying, if not prolonged, has a beneficial effect in the deeper respiration thereby induced. So stretching, kicking, squirming and waving of arms secure in a measure the needed exercise. Occasional massage is advised, the infant's expression of pleasure being one of the immediate evidences of its beneficial effects. After the creeping age the infant usually secures enough muscular exercise. The creeping pen, raised a few inches above the floor, is recommended for cleanliness and protection against floor drafts.

Daily Outing

It is essential that the baby have frequent change of air. Direct sunlight is needed, but it is advisable be-

fore taking the baby out of doors, that he be gradually accustomed to the outside air by opening the windows of the nursery for a short period each day, keeping in mind the need of additional clothing in cold weather.

As a rule, the child should go out daily after the first month. The more weakly the child the greater the need. One caution should always be observed in his outing, protection from disturbance in securing his requisite amount of sleep. In fact, he may spend the greater part of the day in the open air, if properly protected from *wind* and *sun*.

BATHING

After the first week, the strong, healthy baby should be bathed daily. The temperature of the first baths should be about blood heat, 99° F. This may be reduced gradually so that at the end of the month the temperature will be 95°, at six months 90° and by the end of the year 85° to 80°. It is well to finish bathing and drying the head before undressing the baby. Little soap is required and if the skin is unusually delicate, that known as "superfatty" is advised. The convenience of the double ewer is seen in having a supply of water free from soap for rinsing. Unless some irritation is present no powder need be used. The addition of the bran bag to the bath for children with a tendency to eczema, and of salt for its stimulating properties to the infants needing it, is recommended. The daily bath should be given midway between feedings and should not last longer than five

Temperature

Bran and Salt Bath

minutes. The toweling, though thorough, must be lightly and quickly done.

Special Care

The special care of the eyes, nostrils and mouth must never be omitted. As soon as the temporary teeth have appeared, they should receive as faithful attention as the permanent, since they are as subject to decay, and effects of digestive disturbances are greater in the child. Nothing should ever be introduced into the external ear with the exception of a twisted bit of gauze, gently applied for the purpose of drying.

Not only are the genitals subject to local disorders but general mal-nutrition, obstinate reflex nervous disturbances and injurious habits are too often the result of their neglect. The daily bath should ensure thorough gentle cleansing of the delicate parts, which with the boy baby, should include the complete retraction of the foreskin. If this is not accomplished by the end of the first month the physician should be consulted.

In hot weather a rapid sponging with tepid water at night will secure for the baby a more restful sleep.

Duration and Frequency

The duration, as well as the frequency of the bath, should depend entirely upon the reaction; blueness or chilliness of the surface, or signs of exhaustion are always indications of too frequent or too prolonged bathing.

REGULATION

The structure of the rectum and lower bowel in infancy, with the weakness of the abdominal walls, makes

extrusion of firm feces somewhat difficult. In the care of the infant no day should be allowed to pass without at least one free bowel movement. The establishment of the habit of regular defecation is possible at a surprisingly early age. The regular practice of holding the baby over the chamber before an evacuation will soon, by association, lead to defecation when placed in that position. If this practice is followed by the end of a few months the nursery chair may replace the diaper.

Constipation

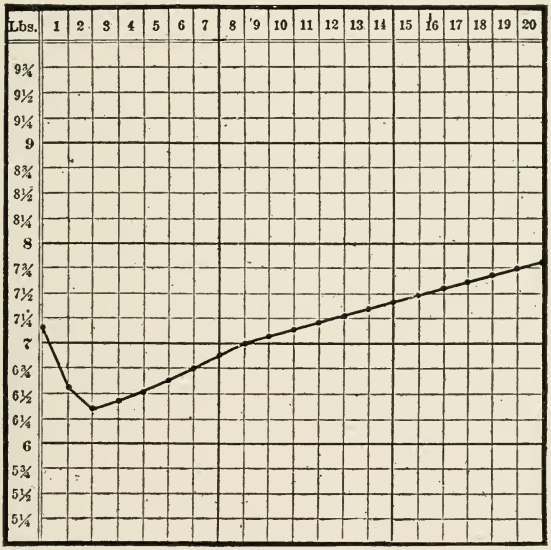
In obstinate constipation the daily movement may be secured only by the judicious use of the soap or glycerine suppository, or preferably, a small soap and water enema administered with the baby lying on his stomach across the lap. A copious injection is best given with the baby lying on his left side.

In older children the rectum is usually empty. When the fecal mass descends into the rectum the uneasy sensations are produced which precede a normal evacuation. If this call is neglected the action of the rectum is reversed and the fecal matter is forced back again into the less sensitive portion of the large intestine where it may remain and harden by the absorption of its fluid constituents. By frequent repetition even the rectum loses its sensitiveness so that large accumulations of fecal matter may occur without exciting evacuative desire. The calls of nature must be regarded as imperative. Their neglect may be the beginning of grave and irremediable conditions, such as

The loss of weight in the first three days is about ten per cent. This is usually regained by the end of the first week. The reason for this early loss is due partly to the loss of fluids from the interior as well as from the surface of the body, and partly to the con-

First Loss in Weight

Daily Weight Chart (Holt)



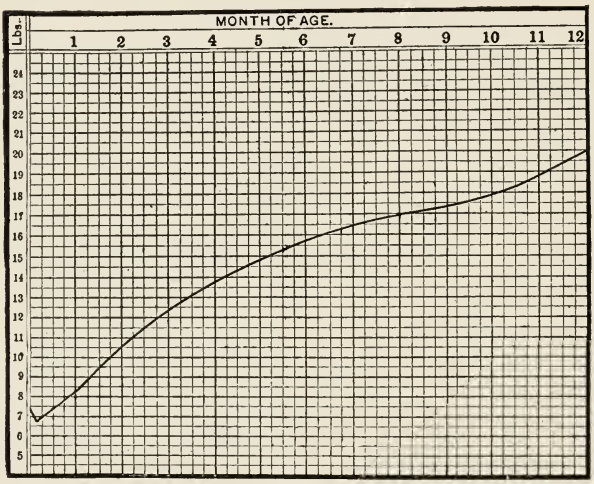
sumption of the stored body material before the first feeding takes place.

The loss of weight is several ounces but at the end of the first week the baby has usually regained most

Rate of Increase

of the loss. After this the gain should be steady. During the last three weeks of the first month and the entire second, this gain is about an ounce a day. During the third and fourth months about three-fourths of an

Monthly Weight Chart (Holt)



ounce a day, hence the normal infant has doubled its birth weight by the end of the fifth or sixth month. The gain decreases after this from two-thirds of an ounce to one-half an ounce a day as the infant grows older, until the weight has trebled at the end of the first year.

Gain in Length

The length of the average baby at birth is nineteen inches; this he doubles in four years. The increase

during the first year (about half of the initial length) being nearly double that of any succeeding year. The average increase of the second year is about four inches, and from that time on to the age of eleven or twelve years from two to three inches annually.

Relative Growth

As the weight and height increase there is also a relative value of dimension of the various parts of the body. The legs grow much more rapidly than the trunk but the girth of head and chest are of the greatest moment in determining the normal growth. The circumference of the chest, though smaller at birth, should exceed that of the head before the end of the second year.

The Chest

On account of its compressibility the shape of the chest depends largely upon the continous action of the muscles, hence the deformities so frequently seen as the result of retarded bone development. Any prolonged pressure from improper position or constricting clothing may add greatly to chest deformity.

The Head

The increase in the circumference of the head in early life is remarkable and like that of the body weight is more rapid during the first year, increasing three inches during the first six months, a little more than one inch the second six months, three-fourths of an inch the second year and less than half an inch the third year. By the seventh year the head has attained nearly its full size.

The fontanel diminishes in size towards the end

of the first year and is ordinarily completely closed before the end of the second year.

Development of Powers

This period of growth also shows a constant development of acquisitions. The ability to shed tears generally comes at the age of three or four months. The new hair has begun to grow and increased powers of digestion are developed. This is the time when the child begins to "drool," a sign not of irritation caused by the cutting of teeth but merely an evidence of the increased flow of saliva due to development of digestive secretions.

The characteristic coating of the baby tongue persists during the greater part of the nursing period. The roof of the mouth gradually becomes more arched with the development of the gums and teeth. The soft palate becomes ampler as it descends to its more verticle position, and the tonsils increase in size.

The growth of the stomach is most rapid in the first half of the first year, of which the first three months exhibit by far the greater rate of increase. It maintains a very constant ratio of increase with that of body weight in the first year of life.

Capacity of the Stomach

The following table represents fairly the average capacity of the stomach at different ages:

At birth	1 ounce.
End of 1st month	2½ ounces.
End of 2nd month	3½ ounces.
End of 3rd month	4½ ounces.
End of 4th month	4¾ ounces.
End of 5th month	5 ounces.
End of 12th month	8 ounces.

TEETHING

The development of the temporary teeth begins with the first formation of the jaws, about the sixth week of intra-uterine life. At the time of birth the crowns of all the temporary incisors and canines are fairly advanced in calcification.

The gums at first are smooth and firm and of a light pinkish color. The edges are rather sharp but grow broader after a few months, as the time of teething draws near.

Milk Teeth

Of the temporary or milk teeth as they are called there are twenty, ten in each jaw; two central incisors, two lateral incisors, two canines and four molars. The lower canines are called the stomach teeth.

Order of Eruption

The teeth have a certain order of eruption, but variation is not uncommon. It is not a continuous process, but occurs in groups, with intervals of repose between successive groups. The lower central incisors appear from the sixth to the ninth month, their coming being completed in about ten days; then follows a resting period of two or three months, after which the upper incisors appear, both central and lateral. After an interval of a few months come the lower lateral incisors and first molars, four or five months later the canines and finally, about the second year, the second molars.

Order of the Eruption of the Temporary Teeth

Lower central incisors	6th to 9th month.
Upper incisors	8th to 10th month.
Lower lateral incisors and first molars	15th to 21st month.
Canines	16th to 20th month.
Second molars	20th to 30th month.

Scarcely a year elapses after complete eruption of the milk teeth before absorption begins at the root and advances towards the crown which either falls off or is pushed out by the growth of the permanent tooth below.

Permanent Teeth

The permanent teeth, of which there are 32, may be divided into two sets, the ten anterior which succeed the milk teeth and six others that are added farther back in the jaw. During the growth of the teeth the jaw increases in depth and length and undergoes changes in form.

Order of Eruption of Permanent Teeth

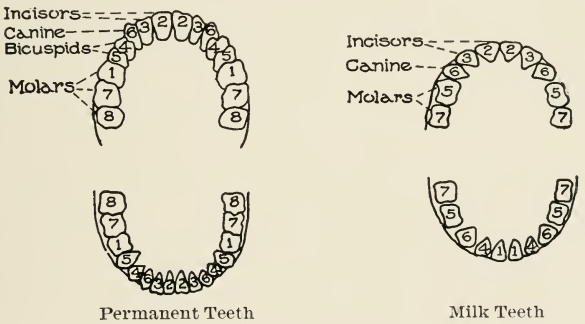
First molars	6th year.
Central incisors	7th year.
Lateral incisors	8th year.
First bicuspids	10th year.
Second bicuspids	11th year.
Canines	12th to 13th year.
Second molars	12th to 15th year.
Third molars (wisdom teeth)	17th to 25th year.

The lower teeth usually precede the upper.

Teething Falacies

The prevalent notion that the eruption of the teeth is responsible for many of the disorders of infancy is not only fallacious but is productive of considerable

harm. The terms "teething fits," "teething diarrhoea," "teething fever," etc., have no foundation in fact. Many infants have been lost for want of professional aid because of a mistaken notion that the acute disorder was a necessary accompaniment of teething. Occasionally, however, the gum over the advancing



Permanent Teeth Milk Teeth

DIAGRAM SHOWING USUAL ORDER OF ERUPTION OF THE TEETH, UPPER FIGURES REPRESENTING THE UPPER JAW, LOWER FIGURES THE LOWER JAW.

tooth shows some swelling and the finger biting and the general peevishness of the child finds relief with the appearance of the tooth. As a rule, the so-called symptoms of teething are the *appearance of teeth.*

Confusion of Ideas

The fact that the teeth make their appearance at a time when the transitional condition of infant develop-

ment predisposes to a variety of disorders has led to a confusion of ideas. The universal dread of the "second summer" (teething summer) is the outgrowth of the frequency of digestive disturbances at this time to which the eruption of the teeth bear little or no causative relationship.

Retarded Teething

No tooth eruption is ever retarded by the toughness of the gum. Its advance may be arrested by a temporary cessation in its growth due to nutritional disturbances, which of themselves produce the symptoms frequently ascribed to the slow coming tooth.

DEVELOPMENT OF SPECIAL SENSES

Motor Development

Schiller's observations on the motor nerves of the eye show the perfection not only of its mechanism, but also of its function, at an early period of infancy. This illustrates the method of growth in so much that this mechanism furnishes one of the channels of information before the higher centers are capable of utilizing it, the process being an educational one.

As the power and control of motion increases there is a development of senses which are the pathways to the mind. The nervous system of the infant shows well developed sensory and motor tracts, but the control power of the higher centers is tardier in its growth.

Taste and Touch

Taste and touch, especially of the lips and tongue, are fortunately the first of the special senses to show

activity, as these are necessary in the instinctive efforts of the young to obtain sustenance.

Hearing

Hearing, although demonstrated as present in the first twenty-four hours, is not developed sufficiently to differentiate between sounds before the end of the third month.

Vision

Contemporary with the function of hearing is that of vision. Although sensitiveness to light and blinking on the near approach of objects has been observed from the first weeks, still it is not until the end of the second month that the infant may recognize his mother by sight.

At first the infant's movements are automatic or instinctive, the voluntary muscles showing only the purposeless, irregular, and unsymmetrical movements suggestive of the mere continuance of the intra-uterine existence. Co-ordinate, voluntary movements are first seen in the face and upper extremities, the hands in addition to grasping showing prehensile tendencies by the end of the third month. Objects are carried to the mouth at about this time. The many ineffectual attempts to locate the mouth indicate the vast amount of energy necessary to develop co-ordination. Although the apparatus including muscles and nerves is fairly complete, it requires multiple repetitions of sensations, impressions, volitions, and efforts at volition, before the establishment of such co-ordination as will ensure the performance of the most simple voluntary motion.

Expression of Emotion

About the end of the third month the voice is recognized as expressing emotions such as anger, fear or pleasure. About this time tears are observed to accompany the crying. It is interesting to note that perspiration is not common before the end of the third month.

Following the development of the senses of sight and hearing to the extent of differentiating as to the color and size of subjects and the quality and direction of sound, we find co-operation of the muscles of the neck to a degree that the infant's head is held erect, balanced and turned at will.

Sitting

After the eighth month the infant should be able to sit for a short time without support and shortly after he begins to creep, roll or hitch towards desired objects. About the tenth month he usually utters a few indefinite syllables, singly or repeated, as da da, ma ma, goo, etc.

Standing

Between the tenth and twelfth months he shows a disposition to pull himself up on his feet, is usually able to stand by a chair and, exceptionally, may walk alone at the end of the first year.

Walking

Infants exhibit a marked variation as to the time of these acquirements, dependent largely upon muscular vigor and education. A child left much alone will learn to develop his resources earlier. On the other hand, he will talk earlier if associated with other children.

The subject of infant hygiene should not be dismissed without reference to a practice that is as per-

nicious as it is common, viz., the custom of regarding the baby as a plaything, an animated toy for the entertainment of the family as well as a large circle of admiring friends. Children are fond of babies and never tire of stimulating their funny performances. The same is, unfortunately, true of parents and friends, but from a purely economic point of view, such amusement is exceedingly expensive, and the mortality statistics are constantly increased for the amusement of the elders. Nervous and mental wrecks too frequently owe the origin of their disorders to want of repose in early infancy, due to injudicious stimulation. In this connection let it be understood that all evidences of mental precocity, called "smartness," should be regarded as danger signals and call for repression, rather than encouragement. Axiom—*An infant during the first year should neither be amusing nor amused.*

The Baby not a Plaything

TEST QUESTIONS

The following questions constitute the "written recitation" which the regular members of the A. S. H. E. answer in writing and send in for the correction and comment of the instructor. They are intended to emphasize and fix in the memory the most important points in the lesson.

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CARE OF CHILDREN

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between the answers for the notes of the instructor. *Use your own words* and answer fully. Read the lesson paper a number of times before attempting to answer the questions.

1. What special precautions should the expectant mother take?
2. What are fontanelles and why should they be guarded?
3. What can you say of the bony development of a young baby?
4. Give a brief outline of the first three days' care of the new born babe?
5. How would you sterilize gauze? Why is this necessary?
6. Why is the baby so susceptible to temperature changes?
7. In clothing an infant what principles are to be observed?
8. Describe the clothing suitable for baby's first six weeks.
9. What may be the effects of tight clothing about the chest? Abdomen? Hips?
10. How should a baby be put to sleep?
11. Name some of the commonest causes of disturbed sleep.

12. What objections are there to the "soother"?
13. Give your ideas of a nursery.
14. What can you say of the effects of teething upon the infant's health?
15. During what period is growth most rapid?
16. Why is familiarity with the rate of growth important?
17. Name the milk teeth and give their order of eruption.
18. Why should the temporary teeth be cared for and how?
19. How do you interpret the statement "The senses are the pathways to the mind"?
20. What objections are there to playing unduly with with the baby?
21. Is any point not clear or are there any questions?

Note.—After completing the test sign your full name.

NATURE'S METHOD.

"The act of nursing in its perfection is the result of the mutual co-operation of mother and child."

CARE OF CHILDREN

PART II

Nutrition of the Child

Importance

The subject of nutrition will always be of paramount importance in the care of infants and children. As important as food is to supply energy for the manifold functions of adult life, it is doubly important during infancy, as during this period the demands for material for growth are most imperative. Since, therefore, the necessity for food is a double one during the developing period the importance of a thorough knowledge of all that pertains to foods and feeding cannot be exaggerated.

Diet and Infant Mortality

Errors in diet, especially in infancy, are responsible for more deaths and cases of imperfect development than all other causes combined. In fact, the highest degree of infant mortality, especially during the summer months, is admittedly due to mismanagement of the feeding. For this reason infants nursed at the breast are fortunate, as they escape many of the dangers to which artificially-fed infants are subjected.

Requirements of the Child

Children, as well as infants, require the best of nutrition, not only to meet the demands for material for growth, but also to furnish energy for the enormous work of training and educating the muscles, as well as for the development of the mind. The school pupil is a machine which not only converts raw mate-

rial (food) into ideas, but also utilizes the food to construct the machine itself. What wonder, then, that many failures in the educational scheme must be attributed to the improper food supply. Because of imperfect nutrition, the imperfect machine not only furnishes unsatisfactory products, but is liable to mishap from its inherent weakness, as in the case of children who fall an easy prey to the various infections against which a well-nourished constitution would have proved a safeguard.

NATURAL FOOD

Nature's Supply

For the second "want" of the infant, namely, *food,* ample provision has been made by nature in an apparatus admirably adapted to its requirements.

It is evident from the anatomy of the infant that he is especially adapted for the act of nursing. This the infant does instinctively.

That no fully-developed milk is found in the breasts at the time of birth has been generally accepted as conclusive evidence that the new-born child is in no immediate need of food. In fact, his deportment, if undisturbed, suggests the need of rest during the first forty-eight hours after birth. This belief is so universal that attempts at feeding before nature has furnished the supply have not met with general approval.

Early Nursing Advisable

However, it is recommended that the child be put to the breast early for two reasons: First, to stimulate milk secretion; and, second, in the belief that the

first secretion (colostrum) promotes early evacuation of the bowel. Probably, by so doing, the child secures a little of the water so much needed at this time.

Loss of Weight

The infant's habitual loss in body weight during the first days, as shown by tables on growth, has been regarded by some as unnecessary. In fact, it is claimed to be unfortunate, as interfering with the rate of subsequent growth. On this account some physicians recommend that nourishment be supplied during the first two days. This is usually unnecessary, however.

If the milk is slow in coming the baby may be given on the second day, every four hours, a tablespoonful of boiled water slightly sweetened with milk sugar. *Caution:* If this procedure lessens his eagerness for the breast, it should be discontinued, as much depends upon his early learning to nurse.

Rules for Control of Nursing

Intelligent control or supervision of the act of suckling averts or corrects many evil effects of its abuse when left entirely to instinct. A few rules may be formulated, the observation of which is manifestly important in the hygiene of nutrition.

(1) *Ascpsis must be observed,* since one of the commonest causes of infantile disorders is infections introduced into the stomach. To this end the nipple, as well as the infant's mouth, for the first few weeks, must be cleansed before and after nursing. Milk remaining exposed to the air shortly swarms with micro-

organisms, many of which cause disease when introduced into the digestive tract of the infant. Even the milk in the orifices of the ducts often becomes infected, hence the expression of a few drops is recommended before each nursing.

In this connection it should be remembered that little or no hydrochloric acid is secreted in the stomach of the infant for several months. This acid in the gastric juices of the adult kills almost all the germs introduced with food. The absence of such a safeguard necessitates special care to exclude the germs of decomposition and disease from the intestinal tract of the infant.

Frequency

(2) *The infant should be put to the breast every two hours during the day and once or twice at night during the first six weeks.* From six weeks to three months the interval between feedings should be increased to two and one-half hours. Between the third and sixth month the interval should be increased to three hours, giving seven feedings from 5 A. M. to 11 P. M., inclusive. Night feeding may be discontinued. Six feedings a day should be sufficient for a child at six months. By the end of the year he may be accustomed to five.

If sleeping, he should be wakened at the proper time for nursing until the habit becomes established.

If the milk is abundant the breasts should be used alternately at first; later, the child may need both breasts at a feeding.

Meals at all Hours

Disturbed digestion is the common result of too frequent or irregular feeding. A certain definite time is necessary for the disposition of an ingested meal. After this an interval of rest is required for the proper re-establishment of the digestive function. Nothing is more abhorrent to nature than "meals at all hours." The practice of the mother sleeping with the babe on her arm and quieting his restlessness throughout the night by offering the breast is, unfortunately, too prevalent, the result being that instead of receiving one definite feeding, the helpless infant is made the victim of a perverted instinct, and sooner or later may be permanently injured.

The digestive process is one of varied stages, each dealing with a changed condition in the mass of food taken. It is apparent from this that some of the digestive secretions which make their appearance only as certain stages of the digestive process are reached, are not at all suitable for freshly ingested food. Probably no vicious practice presents such vexatious problems in our efforts at correction as the results of too frequent feeding.

Position in Nursing

After convalescence, the night nursing, like that of the day, should be accomplished with the mother seated in a comfortable chair, and as soon as through the baby should be "changed" if necessary, and returned immediately to his crib. In this way, the mother, as well as the baby, secures the maximum of unbroken rest.

Time of Nursing

(3) *The time occupied in nursing and the quantity taken should be controlled by the mother.* The differences in the formation of the nipple and in the supply of milk in different mothers affects nursing more or less. There is a difference, too, in the nursing energy of different infants, so that one infant will occupy half an hour in securing his dinner, while another may gorge himself in ten minutes. The act of nursing in its perfection is the result of the mutual co-operation of mother and child. *A child can not properly nurse the passive breast of a sleeping or even inattentive mother.*

In breasts where the nipple formation is imperfect, making the nursing laborious to the infant or painful to the mother, or when milk secretion is tardy or insufficient, the mother should aid and encourage the babe by placing herself in full harmony with the pleasurable duty of the moment, and endeavor to secure a full response to the stimulating appeal of the tiny solicitor for a better supply.

Mother to Control

When the milk flows too freely, or in case of infants who nurse with such avidity that the process from beginning to end resembles a struggle against suffocation, the mother should control the outflow. This may be done by dexterous manipulation of the nipple between the fingers, by withdrawing from the mouth, or by diverting the baby's attention.

It is safe to say that *twenty minutes* should be given to each nursing. Too rapid feeding throws into the

stomach a large quantity of food, with the result of over-distention, and *hasty* feeding invariably means *over*feeding.

Overfeeding

Not infrequently the stomach resents this abuse by immediate regurgitation of a portion of its contents, which has led to the erroneous belief that the stomach is endowed with some quality which enables it to reject superfluous food. That this is a pernicious error, the frequent occurrence of gastric dilatation and intestinal indigestion is ample evidence. A little sterilized water given before nursing frequently prevents the over-ingestion of milk. Instinct is not *always* a guide as to the amount a child should nurse.

Water

(4) *Give water systematically and freely.* The baby's food, as will be shown when we consider the composition of milk, is made up of several widely different constituents. Although all of them are essential for perfect nutrition, one or more may be temporarily omitted without any immediate perceptible interference with vital processes. In fact, one only must be present under all circumstances, and this is *water.* Without water no digestion, absorption or elimination is possible. Water enters largely into the composition of the infant's food, milk containing about 88 per cent. Water is essential to peptone absorption, and many diseased conditions result from an insufficient supply.

Thirst

The restlessness of an infant is frequently only an expression of his thirst. Often unrequired and inju-

rious food is forced upon an unwilling stomach in response to the infant's appeal for water.

Uric Acid

Evidences of pain, usually ascribed to intestinal colic, are too frequently indicative of uric acid irritation and point to a need for more water. Fortunately the doping of the baby with carminative "teas" for the supposed intestinal spasm occasionally fulfills the needs of the child through the water of the decoction. There is very little danger of giving a baby too much sterilized water, as it passes quickly out of the stomach and is absorbed. The water should be given at blood heat, either with a spoon or from a nursing bottle.

Composition of Mother's Milk

Milk is an emulsion of innumerable minute globules of fat floating in plasma. Among the globules are smaller particles of proteid matter.

All the five principal classes of foods are found in milk, viz.: *water, fats, proteids, carbo-hydrates, (milk-sugar)*, and *salts.*

A symmetrical development requires not only the presence of all the constituents, but that they should maintain a certain definite quantitative ratio.

Importance of Water

Although perfect nutrition is dependent upon the presence of *all* these food principles, life may be maintained for a longer or shorter time if one or more be omitted from the diet, *always excepting water.* Thus an infant may exist for a time on water and sugar, as a solution of sugar of milk, or on water and proteids, or on water and salts; the result, however, in each

case invariably showing the deficiency of the constituents in impaired nutrition. (This is so well recognized that the absence of one or more of these essential constituents is not infrequently determined by the condition of the infant.)

Proteids

The *proteids* furnish the only source from which the tissues obtain nitrogen, without which no protoplasm can exist, nor cell life be possible. Insufficient nitrogen means interrupted gain in body weight, lessened muscular force, anaemia with the weakened heart's action, arrested secretions and all the evidences of lowered nutrition.

Fats

The *fats* are necessary, not only to maintain the body heat, but to aid in the formation of bone and nerve tissue. Fat also maintains the healthy function of the lower bowel by promoting the passage of the faeces. A deficiency of fat produces results distinctly characteristic of impaired nutrition so uniform as to have been classified under the one term, *rachitis*.

Sugar

Sugar furnishes muscular energy and heat and increases the formation and deposition of fat, sugar-fed babies frequently showing a remarkable plumpness, even though fat and proteids are low in the food.

Salts

The fourth group—*the salts*—principally those of lime, phosphorus, potash, soda and a trace of iron, forms a small but fairly uniform and very important percentage of the total constituents.

A deficiency in any of these salts shows quickly in the impairment of the child's bony, nervous, muscular, circulatory or digestive system.

Water Absolutely Necessary

Were all the other ingredients present in normal mother's milk in proper proportions, the absence of water would render them valueless for food. It is only in a state of solution that these substances can undergo digestion in the intestines of the infant. The normal secretions of the digestive tract are relatively scant in proportion to the enormous work accomplished during the growing period. Hence, the necessity for water at all stages. Attention is again called to what has been said in the preceding pages, as the importance of the demand for water can hardly be overestimated.

Variation in Quality

As before stated, normal mother's milk is made up of these five constituents; moreover, they maintain a fairly constant percentage relationship. Frequent variations, however, are observed in normal milk, as in different mothers, or in the same mother at different times, or in the same mother in the different breasts, or in the same breast at the same nursing drawn at different times, as fore, middle and last milk.

Test of Food

Of these constituents the percentage of fat is subject to the widest variation; next, the proteids; the milk sugar and salts showing little change. Nor would these variations be considered as indications of abnormality, the only criterion being *its effect upon the child*. An infant at the breast, digesting well, gaining steadily in weight and strength, is getting good milk, regardless of what the analysis may show. It is a fact of common observation that the breast at

which one infant thrives may not meet the requirements of another child of the same age.

CHANGING THE QUANTITY AND QUALITY OF THE MILK

Variations in Quantity

Milk secretion is subject to variations in quantity as well as in quality. In the majority of mothers it is regulated to meet the requirements of the infant, although instances are not uncommon in which the quantity is insufficient. On the other hand, it frequently occurs that the mother may successfully nurse two infants, as in cases of twins, or in wet-nursing in foundlings' homes. From this it may be inferred that in some mysterious way, and to a limited extent, the supply is regulated by the demand. The growth of large babies is relatively more rapid than that of smaller ones, and it would appear that to a certain degree there is an automatic adjustment of the quantity of milk to the needs of the child.

It is a question whether the daily quantity of milk can be increased by any *medical* agent. However, the milk secretion is quite sensitive to many influences, both as to its quantity and composition.

A so-called "dry diet" in which there is a deficiency of water, usually diminishes the secretion, while, on the other hand, it may be increased by a liberal allowance of water, milk and other fluids.

Increasing Quantity

The secretion of milk, when scanty, may be increased by any agency that increases normal metabolism (digestion and assimilation); as diet, exercise, massage, electricity, fresh air, sunlight, congenial

surroundings, freedom from physical discomfort and an equable temperament.

Sudden emotion, as grief, anxiety, anger, fear, or anything that produces shock or profoundly impresses the nervous system, may not only diminish the secretion, but occasionally cause total suppression.

Regularity should be observed in putting the child to the breast, even though there be little evidence of milk as the secretion is undoubtedly promoted by the act of nursing.

Mental Attitude

Attention is again called to the mental attitude of the mother during nursing, as influencing the quantity of milk. It must not be forgotten, however, that *over-anxiety* to produce defeats its very object.

Loss of fluids from any cause, as copious perspiration, menstruation or diarrhoea, may lessen the amount of the milk.

Changing the Fats

The *relative proportion* of the constituents of the milk may be influenced by variations in the hygiene of the mother, especially in the diet. The former belief that the fat of the milk was increased by the fat eaten has been repeatedly disproved by actual experiment. It is believed to-day that the proportion of fat in the milk depends largely upon the amount of *proteid* in the mother's food, increase or decrease in the latter causing a like change in the former. The mere eating of proteid food, however, is not sufficient to produce a "rich milk," since thorough digestion and assimilation are essential to fat production.

Fat may be scanty in the milk, not only from an insufficiently nitrogenous diet, but also as a result of *excess of fats* in the food. Examples are not wanting of mothers who in their efforts to enrich their milk defeat this object by drinking too much rich milk or cream.

A poorly nourished or rachitic infant is frequently seen at the breast of the mother whose diet consists largely of starchy foods. The substitution in this case of a diet of eggs for breakfast, meat for dinner and supper, with a cup of beef broth between times, and a limited supply of vegetables and sweets will almost invariably show an increased percentage of fat in the milk, with subsequent improvement in the nutrition of the child.

Too Much Fat

It occasionally occurs that the infant shows the effects of excessive fat in the so-called "fatty diarrhoeas," in which fat is seen in the diapers in glistening masses or floating on the surface of the washing water. Again, in the "spitting babies," who regurgitate their food shortly after nursing, analysis of mother's milk shows sometimes as high as seven or even nine per cent fat. In such cases meats should be restricted and vegetables and breadstuffs substituted in the mother's diet.

Changing the Proteids

The proteids are rarely low except in cases of exhaustion or debility, as from sickness or insufficient food. In this condition the milk is poor and watery, there being a deficiency in all the solids. In such

cases the hygiene of the mother requires a liberal diet with all the accessories for the improvement of her general nutrition. Here nitrogenous foods are necessary to increase proteids in the milk. It may happen that the mother's milk in cases of debility shows an excess of proteids with a deficiency of other constituents, the debilitated infant exhibiting evidences of indigestion, in constipation or in diarrhoea and vomiting.

Excessive Proteids

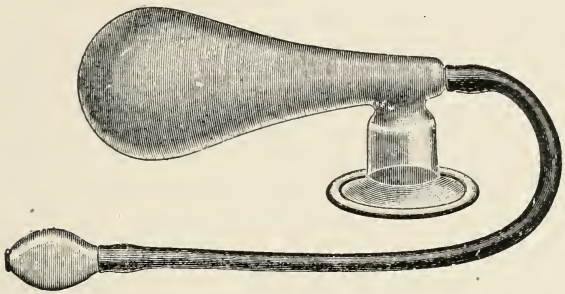
Excessive proteids may appear, also, in the milk of the overfed mother of sedentary habits for whom exercise in the open air with reduction of diet is required. Idleness and discontent may be replaced by congenial occupation, to the improvement of the milk in this respect. The relief of constipation or the alleviation of any bodily discomfort may alone be sufficient.

Colostrum Milk

Violent agitation of the nervous system of the mother may change the quality of the milk almost instantly. Quite frequently, under these circumstances, it resembles colostrum in its changed proteids, low fat and colostrum corpuscles. Instances are known where convulsions and even death to the nursling have followed.

The secretion of the colostrum milk sometimes follows undue fatigue, excitement, anger, grief, also menstruation and conception. Disturbances of digestion in the infant are frequently the first intimation of

pregnancy in the mother. In the event of the above disturbances, the child should be removed from the breast and artificially fed until the milk approaches the normal as shown by analysis. Meanwhile, the breasts should be emptied regularly by the breast pump.



SUCTION BREAST PUMP.

Effect Frequency of Nursing

Both quantity and quality of the milk are influenced by the *frequency* of nursing. Poor milk usually results from irregular intervals in nursing. The more frequently the breasts are emptied, the higher will be the percentage of solids, especially the proteids. The infant, restless from indigestion induced by excess of proteids, often is unfortunately given the nipple at short intervals to quiet him. The result is increased indigestibility of the milk from greater excess of proteids. What is needed is water for his thirst, rest for his stomach and rest for the mammary glands.

In conclusion, a table may best express a summary of the means at our command for regulating the composition of mother's milk.

The percentages of sugar and salts vary but little.

The Percentage of Proteid may be Increased by

Increased frequency of nursing.
Increased liberality of proteid food.
Insufficient exercise.

The Percentage of Proteid may be Diminished by

Diminished frequency in suckling.
Diminished proteid food.
Increased exercise.

The Percentage of Fat is Increased by

Increased proteid diet.

The Percentage of Fat is Diminished by

Deficiency of proteid food.
Excess of fatty foods.
Fasting.

The Percentage of Water is Increased by

Increased fluid diet.

The Percentage of Water is Diminished by

Saline cathartics.
Diminished fluid diet.

Care of the Mother

The nursing mother must keep herself in the best possible physical condition if she would have a healthy, contented baby. She should take daily exercise in the open air, simple food, and plenty of sleep. She should keep free from worry, avoid too much excitement, undue fatigue and late hours. Constipation should be remedied.

VOMITING

Vomiting should never be regarded as trivial. It should be to the baby feeder as the red light is to the engineer. A careful consideration of all the conditions may determine the cause, which should always be sought, and when found removed. With rare exception, this cause will be found in the non-observance of the rules of hygiene outlined in these lessons. Although almost invariably the vomiting of infancy is due to dietetic errors, it occasionally ushers in some of the graver diseases, such as scarlet fever, measles, meningitis, cholera infantum, etc.

Diminish the Food

Whatever be the cause, no mistake will be made if the food is diminished in quantity or withheld entirely for a time.

The regurgitation of a small quantity of milk directly after a feeding is not always an indication of serious trouble, but may result from overfeeding and careless handling.

WEANING AND SUBSTITUTE FEEDING

The question of substitute feeding is of secondary importance only to that of lactation. Conditions may develop at any time which render breast feeding impracticable. Progressive changes occur in the constituents of breast milk which render it, after a time, insufficient to furnish the material demanded by the rapid growth of the infant. Moreover, the presence of several teeth, the changes in the salivary secretion,

as well as in those of the stomach and pancreas, indicates preparation for digestion of a different class of foods.

Period of Lactation

The changes in breast milk show considerable variation as to the time of their occurrence in different women. Thus, one mother may have exhausted her power to produce good milk by the end of the seventh month; while another woman may continue to furnish good milk until the fifteenth month.

Do Not Wean for Slight Cause

The growing tendency to recommend weaning upon the slightest pretext suggests the need of more emphasis upon the injunction not to substitute artificial for breast feeding until it is clearly proven that the latter can not be made to agree. However, the infant should not be deprived of his right to a fair start in life by being confined to the breast which fails to furnish all the requisites for normal nutrition.

Aside from the normal time of weaning, which should rarely be deferred beyond the twelfth month, occasions may arise during the first year when the decision must be made as to whether the child can thrive on the milk of his nurse. Transient disturbances due to the milk should not be considered sufficient cause for rejecting the breast, since many temporary disagreements may be corrected by attention to the hygiene of the mother or child.

Early Weaning

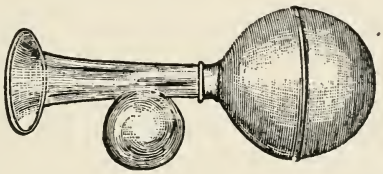
The indications for early weaning, so far as the infant is concerned, are evidences of deficiency in normal development, which is frequently best shown

by a failure to gain in weight. However, weight gain is not always evidence of normal nutrition, as many rachitic babies make fat rapidly.

The process of weaning should be *gradual,* the infant having been accustomed to supplemental feeding commencing with one a day and increasing the number through a period of several weeks.

First Substitute Food

The food selected for the supplemental feeding should at first be weaker than that for an artificially-



BREAST PUMP WITH BULB.

fed infant of the same age and development. This is particularly important in the proteids, which in cows' milk are much more difficult to digest. As the skimmed milk contains most of the proteids, about one-half of this constituent may be replaced with water in the food formula for an infant of the same age. If the new diet is tolerated, the skimmed milk may be increased cautiously from day to day until the regular formula is used.

Time of the Year

The season or time of year must be considered in the weaning, as radical food changes should not be

made at the commencement of or during the heated term, at which time infants are especially susceptible to digestive disorders. The cutting of an unusually troublesome tooth might well delay the change in food.

Artificial Nipple for Use with Sore Breasts

A child should be immediately removed from the breast upon the appearance of acute infectious disease in the mother or upon well-grounded suspicion of the existence of syphilis or tuberculosis. A suitable wet nurse should be secured if possible, in case the infant is free from syphilitic infection.

The development of abscess renders the affected breast unfit for nursing while suppuration continues.

Menstruation

Menstruation frequently disturbs lactation. Its early appearance may not require weaning, but its regular return should suggest its advisability. It is usually best to give substitute feedings during the first day of a period.

The occurrence of conception is an indication for the immediate removal of the child from the breast, as this condition renders the milk insufficient, if not positively injurious.

When it becomes evident that substitute feeding is necessary, the question *what* shall be substituted is of

the greatest importance. *Errors in the management of substitute feeding are probably responsible to a greater extent than any other cause for the high infant mortality.*

The Wet Nurse

The *best* substitute is the wet nurse. The drawbacks to wet-nursing are many and extremely trying, and it is probably on account of these that this substitution is not more frequently resorted to in this country. The wet nurse should be chosen with reference to her temperament, the quality and quantity of her milk and her freedom from syphilis or tuberculosis. She should be examined by the family physician and accepted only upon his recommendation.

Should the first wet nurse's milk fail to agree, it need be no cause for discouragement, as in some cases repeated trials are necessary. In case a wet nurse is not available it will become necessary to adopt artificial feeding.

ARTIFICIAL FEEDING

More has been written and said concerning artificial feeding during the past ten years than all other pediatric subjects combined.

Having studied natural feeding, we should have a fairly practical knowledge of the quantity and quality of food required at different ages, and also the time and method of feeding. That we should keep close to nature, both in the composition and physical properties of the food, seems hardly necessary to state. Yet we see infants fed (?) on compounds differing so widely from those which their organs are prepared to digest that it is surprising so many survive.

Gastric Digestion

The stomach of the infant at birth was found to be little more than a receptacle for food in which the action of rennet coagulating the milk, prepares it for the first step in the digestive process.

As the infant grows the capacity of the stomach increases rapidly, its walls thicken, the glands develop and pepsin and hydrochloric acid secretions gradually become more abundant. It is not, however, until after the sixth month that the salivary and pancreatic secretions develop to any great extent the power of converting the starch into sugar.

This conversion is necessary before cereals may enter largely into the food, as nature has made little or no other provision for the digestion of starch.

During the latter half of the first year the stomach empties itself of a digested meal in two or three hours,

COVERED MILK PAIL IN USE AT CONNECTICUT AGRICULTURAL COLLEGE

The first jets from each quarter of the udder are drawn into a cup and discarded

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MODERN SANITARY DAIRY BARN
From Report of Office of Experiment Stations, 1903

the time depending upon the quality of the food taken, cow's milk requiring the longer time.

Completeness of Digestion

That a very large percentage of the food is absorbed in the *normal* infant *normally* fed, is shown by analysis of the faeces. As a result of observations upon infants fed wholly upon milk, it is stated that the faeces consist of 84 to 86 per cent water; that digestion and absorption of proteids in the alimentary canal are so efficient that but little is lost; that the whitish flakes and clots, nearly always seen, are composed largely of fat, fatty and lactic acids in combination with lime.

Milk acids are always found and to their presence are attributed the slightly acid smell and reaction. Fermentation of milk sugar leads to the development of carbon-dioxide and hydrogen, which are the principal gases in the intestinal tract of a healthy infant fed purely on milk, foul-smelling gases being absent.

Fecal Discharges

Though the amount of faeces varies much in infants, yet three per cent of the milk taken is the average proportion. The fecal discharges after the first few days are an orange yellow, frequently turning to green on exposure to air, are of the consistency of batter and homogeneous throughout. They average from three to five movements daily. These characteristics vary somewhat with the quality of food taken and the completeness of the digestive process.

The urine increases from about six ounces at the end of the first week to eight or sixteen ounces at six

months. There is considerable variation, however, dependent upon the secretions from the skin and bowels and the amount of fluids taken. The marked tendency to urination is variable, occurring sometimes every hour during the day and twice or thrice at night, while at other times several hours may elapse without urination. The urine is usually light in color, of low specific gravity, 1.004 to 1.010, and in health rarely stains the diaper.

Essentials in Substitute Feeding

A few "essentials" from Cheadle may be of value in assisting the student to a practical application of some of the principles already indicated.

Composition

First—*The food must contain the different elements in the same proportions as found in human milk,* viz.: proteids, 1 to 2 per cent; fats, 3 to 4 per cent; milk sugar, 6 to 7 per cent; salts, $\frac{2}{10}$ per cent; water, 88 per cent.

Anti-Scorbutic

Second—*It must possess the anti-scorbutic property.* Infants at the breast very rarely suffer from scurvy, that disease being found among those fed upon condensed or sterilized milk, or upon dried or evaporated preparations. Prompt recovery usually occurs with the food unchanged, except the discontinuance of sterilization. Fresh milk possesses this anti-scorbutic element, but not in large proportion, for milk in extreme dilution will not prevent the development of scurvy.

Quantity

Third—*The total quantity in twenty-four hours must represent the equivalent in nutritive value of*

from one to three pints of human milk, according to age.

No fixed arbitrary rule can be given for all children. Careful observation of the infant as to whether he rejects some of his food soon after taking it or seems hungry half an hour after feeding, may prove a guide. The best indication that he is receiving his full equivalent is a steady weekly gain of two or three ounces or more in the early months.

Animal Origin

Fourth—*It must not be purely vegetable, but must contain a large proportion of animal matter.*

Most vegetable substances are deficient in proteids and yield but a small quantity of fat. Moreover, it is known that the infant does not assimilate them as easily and fully as those derived from animal sources, even though these ingredients be supplied in the proper percentages.

Fluid

Fifth—*It must be in a form suited to infantile digestion.*

The digestive organs, it will be remembered, have only recently assumed their function and are designed to deal solely with the bland, dilute and easily-dissolved nutriment of mother's milk. In the natural method of feeding, the infant gets his nourishment in the same form at every meal; so in artificial feeding variety is not desirable.

As the walls of the stomach are lacking in muscular power and the glands produce but little secretion, it is evident that it is not right to ask this organ to deal

with large masses of solid or semi-solid matter. Solids can be digested only in a state of minute subdivision.

Sterile

Sixth—*It must be as nearly sterile as possible.* Infants are extremely susceptible to stomach and intestinal disorders, having little resistance to bacteria and their poisons. The products of fermentation are highly irritating and the sensitive, unstable nervous system of the infant may be profoundly affected thereby. The gastric secretions of the infant do not contain the protecting hydrochloric acid of the adult.

Cow's Milk

Cow's milk, on account of its cheapness and the abundant supply, is the most available substitute for mother's milk. The proneness to stomach disorders and the great mortality among the bottle-fed babies has led to a systematic study of cow's milk. As a result of this study, some of the reasons why cow's milk does not meet all the requirements of the infant may be shown. The results of recent analyses give the constituents of cow's and mother's milk as follows:

Composition of Milk

Average Composition.	*Cow's.* Per Cent.	*Mother's.* Per Cent.
Specific gravity	1.032	1.030
Total solids	14-13	13-12
Proteids	4.00	1.50
Fat	4.00	4.00
Sugar	4.50	6.50
Salts	0.70	0.15
Reaction	Acid*	Alkaline
Bacteria	Swarming with*	None

*This refers to cow's milk as it reaches the consumer.

It will be seen at a glance that the milks differ but little in specific gravity, in the quantity of their total solids and water, and in their percentage of fat; more widely in their salts, sugar and proteids; most widely in regard to chemical reaction and presence of bacteria.

Differences from Mother's Milk

The sugar in cow's milk is identical with that in breast milk. The fats are nearly the same, although those in breast milk are in more finely divided particles and more easily digested. It is in the proteids that the greatest difference comes, the percentage being much higher in cow's milk and the composition different. The proteids of both cow's and mother's milk are made up chiefly of casein and albumen (lac albumen), but the relative porportion of the casein to the albumen in cow's milk is about 6 to 1, and in breast milk is about 1 to 1. Even the casein in the two milks is not of identical composition; that in cow's milk coagulates in much denser and less digestible clots. The nitrogenous substances called "extractives" differ in the two milks and the mineral parts—the salts—are not the same. Thus it is apparent that cow's milk can not be so modified as to be *identical* with mother's milk. The best we can do is to approximate nature's supply as nearly as possible.

Proteids Cause of Trouble

Most of the disturbances of infants' digestion are traceable directly to proteids; their excess in cow's milk being the principal factor in its disagreement. It is usual to reduce the percentage of proteids by the addition of water.

In this dilution, however, the nutritive value of the milk suffers from a diminution of fats and sugars. Consequently it is necessary that the percentage of sugar and fats be maintained by the addition of sugar of milk and cream.

Modified Milk Laboratories

Laboratories for this modification, like those of the Walker-Gordon Co.,* have been established in the leading American cities, to which orders are sent for definite percentages of modified milk, as drugs are ordered by prescription from a pharmacy. The physician may, at will, control the amount of different ingredients, varying their percentages to meet the varying requirements of the little patient.

Bacteria the Cause of Disorders

That many disorders of infancy are due to the presence of bacteria in cow's milk is no longer a matter of doubt. In addition to infection from the possible presence of such germs as those of tuberculosis, typhoid fever, scarlet fever, diphtheria, etc., it should be emphasized that the proneness of cow's milk to decomposition with its effects upon the nursling is one of the greatest dangers of milk feeding. Hence, the hygienic dairy management becomes a question of the highest importance.

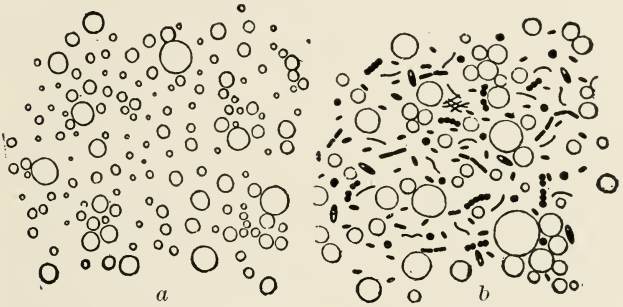
Safe Milk

It has been proved that milk production may be so guarded as to furnish a product comparatively free from bacteria. As an example of what scrupulous

*The Walker-Gordon Co. have laboratories or stations in the following cities: New York, Boston, Chicago, Philadelphia, Washington, Baltimore, Buffalo, Cincinnati, Cleveland, Detroit, Grand Rapids, Milwaukee, Pittsburg, St. Louis, Atlantic City, Princeton, Newark, Elizabeth, Montreal, Can., Ottawa, Can., London, Eng.

UNIVERSITY OF CALIFORNIA

care and cold can accomplish in producing bacteria-free milk, may be mentioned the exhibits of a number of American dairies at the Paris exposition in 1904. Milk and cream were shown that remained sweet for several days after the journey of ten days or more. The officials found it hard to believe that no preserva-



MICROSCOPIC APPEARANCE OF MILK.

a. Pure milk. *b*. After standing in a dirty dish for some hours in a warm room, showing many varieties of bacteria.

tives had been added or treatment given until convinced by analysis and by proof.

Selection and Care of Cows

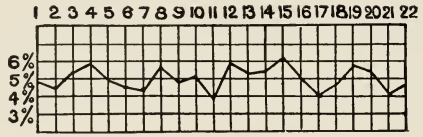
The same care in the selection of the cow is recommended as in the selection of the wet nurse; the same details in her hygiene as well as in the antiseptic care of the milk will insure milk that is practically sterile.

In the choice of the family cow three requisites at least should be kept in view. *First:* The quality of the milk. *Second:* The constitution of the animal,

her hardihood and freedom from disorders and her adaptability to variations in climate and food. *Third:* Her temperament and freedom from disturbances due to accidental causes.

Of many types distributed throughout the country we will discuss but three, viz., the Jersey, the Holstein and the Durham.

Jerseys The Jersey gives a fair quantity of milk, exceedingly rich in cream. In-breeding, however, has made



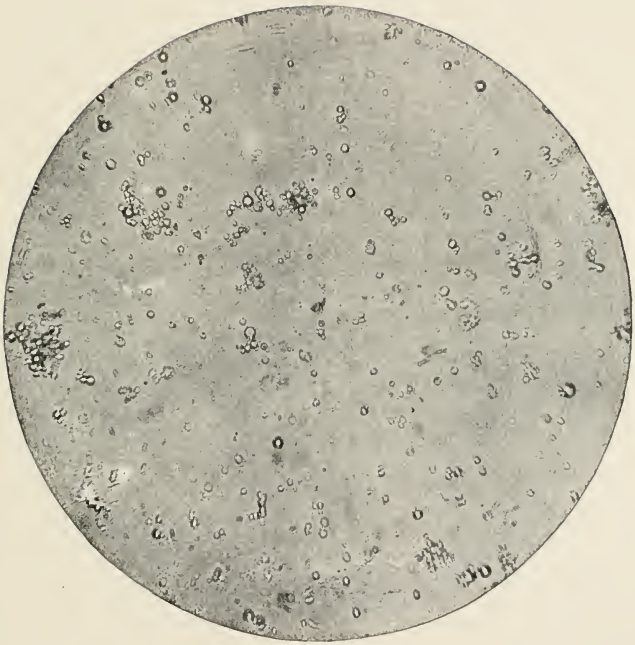
VARIATION IN PERCENTAGE OF CREAM IN ONE COW'S MILK.

her delicate and quite susceptible to diseases, as tuberculosis, etc., and though quite gentle she is nervous and sensitive. The fats of Jersey milk differ somewhat from those in other milks and the globules of fat are larger, thus making it less digestible.

Holsteins The Holstein is docile, hardy and the greatest of all milkers, but the milk is low in the percentage of cream and proteids.

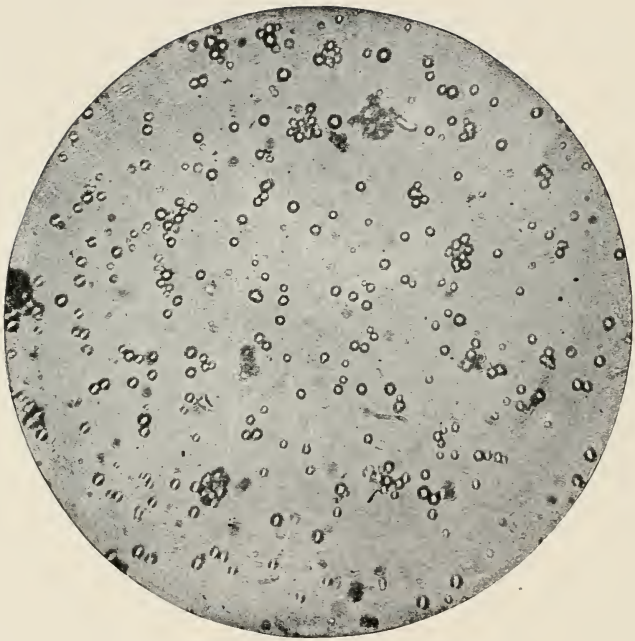
Durhams The third type, the Durham, undoubtedly is the best, as she is a good feeder, of placid temperament, and yields a large quantity of very good milk.

In the best of cows, however, the milk varies from time to time in quantity and quality under the chang-

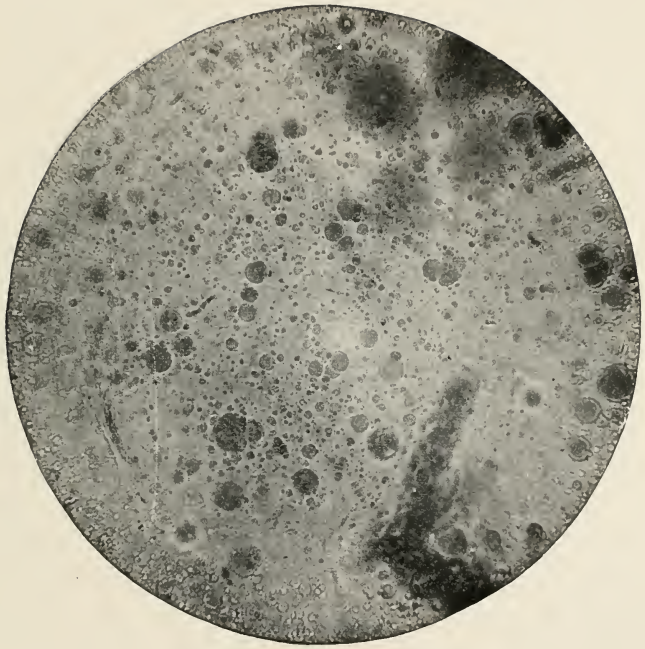


FAT GLOBULES IN HUMAN MILK

Storrs Agricultural Experiment Station, Bulletin No. 31



FAT GLOBULES IN HOLSTEIN MILK

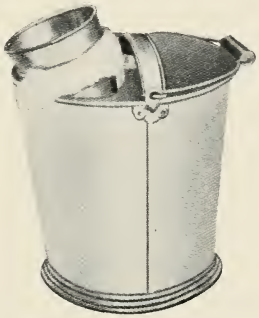


FAT GLOBULES IN JERSEY MILK

ing influences of food, care and surroundings, so that the popular idea of the great value of a "one cow's milk" supply for the baby is erroneous. The mixed product of a herd secures a greater uniformity in the quality and the percentage of constituents.

The Baby's Milkman

The selection of the dairyman should depend upon his known methods of handling his herd and its prod-



THE COVERED MILK PAIL.

ucts. Does he select his cows upon the principles above enumerated? Is his herd regularly inspected by a competent veterinarian for evidences of tuberculosis or other disease? Are the animals properly fed, watered and pastured? Are they comfortably housed in stables that may be cleaned daily and regularly whitewashed? Are the milkers kind, intelligent, cleanly and conscientious? Is the cow cleaned and her udder washed before each milking? Is the first teat full of milk discarded and the remainder received

in a sterilized pail through a cover of cheesecloth? Is the milk immediately strained, bottled and placed in a cooler which rapidly reduces its temperature to 40° F?

Importance of Refrigeration

Rapid cooling and refrigeration are fully as important as cleanliness in the production of safe milk, for

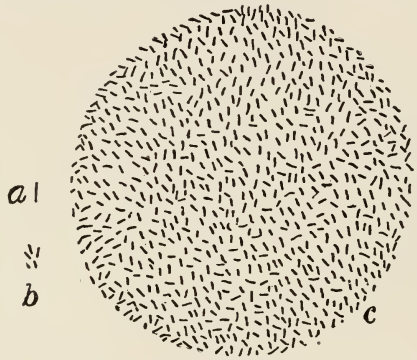


DIAGRAM SHOWING THE RATE OF INCREASE OF BACTERIA IN MILK.

a. Single Bacteria. *b*. Increase in 24 hours at 50° F. *c*. Increase in 24 hours at 70° F.

the few bacteria which are present in even the most carefully-cared-for milk multiply with enormous rapidity at 70° F., while they increase only about fivefold in 24 hours in milk kept at 50° F.

Certified Milk

The above enumeration includes most of the principles, the observation of which is absolutely necessary in the production of milk suitable for baby feeding. The source of supply should be investigated by

COVERED MILK PAILS, SHOWING STRAINER IN PLACE

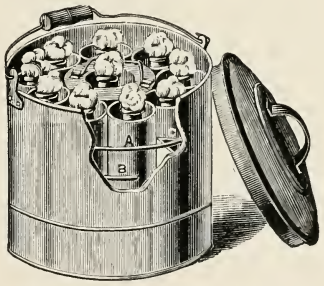
Sixty-three per cent of the dirt that would fall in an open pail kept out by the cover

COVERED MILK PAILS, SHQWING COVERS REMOVED
Storrs Agricultural Experiment Station, Storrs, Connecticut

personal visit if possible. Some dairies in the larger cities furnish milk especially for babies, called "certified milk," at advanced price—12 to 14 cents a quart. It will be found economy to pay the advanced price necessary for the extra care, but it may be well to make sure that the extra care is given.

Home Care of Milk

The cold sealed bottle when received at home must be placed at once in a clean refrigerator (free from taint or odor of other food or vegetables), and kept stoppered. The refrigerator should be kept at least as low as 50° F. This point should be tested with a thermometer.



THE FREEMAN PASTEURIZER.

Milk received in good condition is not infrequently rendered unfit for infants' food by careless handling in the home. The bacteria which by their growth render the milk unsafe are present everywhere —in the air with dust, in every particle of dirt, in water, on the hands and clothes, on all utensils and vessels. (*See Household Bacteriology.*) No utensil, spoon or receptacle should be used which has not been sterilized. Milk once poured out should never be returned to the bottle, nor should remnants ever be used. Flies (common carriers of infections) must be religiously excluded.

Treatment of Unsafe Milk

Where doubt exists as to the safety of the milk, or during hot weather, it may be freed from germs by pasteurization or sterilization. The first is accomplished by subjecting the milk for 40 minutes to a

Pasteurizing

temperature of 150° F. A pasteurizer is on the market in which the bottles of milk are placed and sufficient boiling water added to bring the temperature of the whole to 150° F.* In the absence of a special pasteurizing apparatus, a small jar or cup about the height of a nursing bottle is filled with boiling water. Into this the bottle containing one feeding of milk is immersed, the projecting neck stoppered with sterilized unabsorbent cotton. The whole is then covered with a cozy or another jar to retard radiation and allowed to stand 40 minutes. The temperature should be tested in an extra bottle with a thermometer until the correct amount of boiling water to be added is determined.

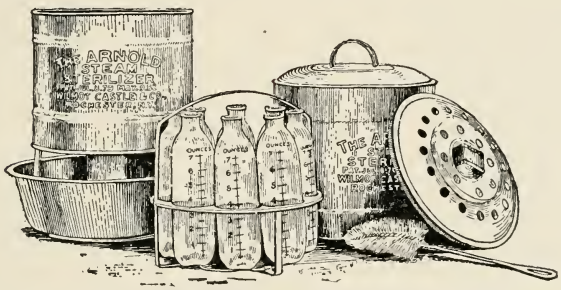
If preferred, the entire day's supply may be pasteurized at once, either in bulk or, better, in a number of separate feeding bottles, which should then be cooled rapidly and kept on ice until used. It is important to cool the milk as soon as possible, for the spores not killed by pasteurizing will develop if the milk is kept warm for some time. The quickest way to do this is to place the bottles in running water.

Sterilizing

Sterilization, i. e., the destruction of both bacteria and spores, is accomplished by heating the milk to a

* The Freeman Pasteurizer. Price, $3.50.

temperature of 212° F. (boiling temperature) for about an hour. This may be done in an ordinary double boiler or farina kettle. Thus treated the milk will keep unchanged for 24 hours or so. If necessary to protect it for a longer period, as for traveling, shipping, etc., the process must be twice repeated after intervals of 24 hours each, when, if properly sealed, it will remain bacteria free indefinitely.



THE ARNOLD STEAM STERILIZING AND PASTEURIZING APPARATUS. Price, $3.00 to $5.00.

Milk Must Be Fresh

It must be borne in mind that no amount of pasteurization or sterilization can make *bad* milk *good*. It merely destroys the bacteria, which by their growth render the milk unfit for infant food. The chemical changes in the milk which, through age, has begun to deteriorate, are beyond retrieve.

Milk should be at first hand, like Caesar's wife, "above suspicion," in which case pasteurization is unnecessary and sterilization is unwise, as the high temperature changes it somewhat and renders it more

difficult of digestion. A child fed *continuously* on cooked or sterilized milk is liable to develop nutritional disorders, as scurvy, etc.

The practice of *keeping* the baby's food warm for emergencies is entirely wrong, as it favors the development of any bacteria present and spores which are not destroyed by pasteurization.

Supply Most Important

Because of the limited field of operation of the milk laboratory home modification is of great importance in artificial feeding. In this connection, *the protection of the supply will ever continue to be the most important consideration.*

MODIFIED MILK

Apparatus and Supplies

To modify milk satisfactorily in the home the mother or nurse must be equipped with all necessary utensils. These include a good ice box, two syphons (made by heating and bending glass tubing), a sterilizer or pasteurizer thermometer registering to 212° F., a dozen graduated feeding tubes (large mouth without shoulder with small lip), bottle brushes, absorbent cotton, straining gauze, non-absorbent cotton for stoppers, mixing pitcher, 8-ounce graduate, tall cup for warming bottle, three to six black rubber nipples (to fit mouth of tubes, reversible for cleaning), bicarbonate of soda and boric acid.

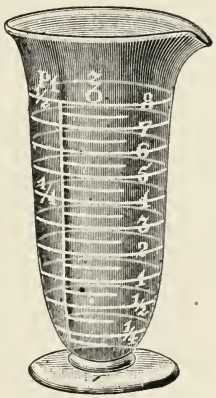
Lime water should be kept in well-corked bottles, as it is soon changed by the carbon dioxide in the air to carbonate of lime, which is deposited on the sides

of the bottle. Milk sugar solution should be prepared fresh for each day's supply.

Time of Preparation

The supply of food may be prepared once or twice in the twenty-four hours, depending upon the time of milk delivery and number of tubes to be used. The milk should always be kept on ice before and after preparation.

All bottles and utensils should be washed with hot soapsuds, then rinsed and boiled or sterilized. Nipples must be scrubbed inside and out with soap and water, rinsed and kept in a solution of soda or boric acid until needed again. Milk tubes when filled should be stoppered with non-absorbent cotton so that in cooling the air may pass through. After warming to about 100° F. (38° C.) by standing the bottle in a cup of warm water the cotton is replaced by the nipple.



AN EIGHT OUNCE GRADUATE.

Warming

After nursing, any food remaining in the bottle must be thrown away. No flies should ever touch food, utensils or baby.

Of course, the nurse will never touch the nipple with her lips. The temperature of the milk may be tested by allowing a few drops to fall upon the back of the hand. *Eternal vigilance is the price of sterility.*

Feeding

The bottle should be held inverted in the hand during the feeding so that the babe will not suck air. If the milk flow is too free the nipple may be withdrawn from time to time so that about twenty minutes is consumed in the feeding, during which the babe

APPARATUS AND MATERIALS FOR MODIFYING MILK.
Walker-Gordon Co.

would better be on the arm or lap of the nurse. If the milk does not drop freely enough more holes should be made in the nipple by means of a hot needle.

Follow Nature

The rules of feeding as to regularity, number and length of intervals should be about the same as those given for infants at the breast. Water between feedings is generally required, and to a ravenous infant should be freely given. The water should be boiled and cooled and may be given from either bottle or spoon.

Composition

As a rule, artificial feeding in the normal vigorous babies should be *begun* with formulae representing low percentages. Especially is this true of the pro-

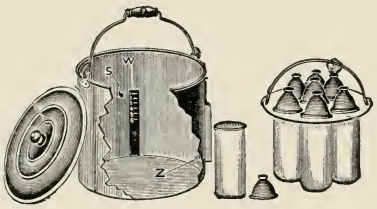
FEEDING THE BABY,
Showing Proper Position of Infant.

teids. Taking average mother's milk as a standard, the percentage of sugar may be about the same, the fats about half, and the proteids about one-third, for the first weeks, remembering that temporary error

on the side of underfeeding is easier of correction than the more common mistake of overfeeding.

Proteids Low at First

The proteid in cow's milk is the most frequent cause of indigestion, and this absolutely essential ingredient requires most careful watching. Since its variation by ever so little is sufficient, at times, to determine results, it would appear to be the point around which the problem of milk feeding revolves.



HYGEIA PASTEURIZER AND STERILIZER.

Hence the importance of the percentage method, both on account of its advantages for comparisons and in its ready adaptability to the necessity for slight changes.

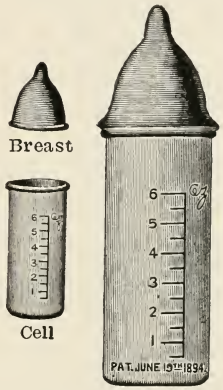
Increase Strength Slowly

As toleration of the new diet is established a gradual increase may be made in the low constituents week by week until the ratio of ingredients approaches the standard of breast milk. The standard formulae given later should be used only as a suggestive guide and not as an imperative rule, since the first test of any food formula is its *effect upon the baby.*

Increase Amount Gradually

In considering increase in the *amount* of food, we must be governed by age, size for age, stomach capacity for age and the infant's hunger, but largely by the daily weight gain which should be manifest from week to week.

The increase in the amount of food, like that of the percentage of its constituents should *never be made suddenly.* An ounce added to the total day's food in early infancy means an increase of from 6 to 3 per cent. This one ounce increase should be distributed among the different tubes, i. e., if there are ten tubes, about one-tenth of an ounce should be added to each. If tolerated for several days another advance may be made in quantity. Four consecutive weeks should be the outside limit for an increase of an ounce at a feeding, as the tendency will be to far exceed the infant's stomach capacity by flooding him with a too diluted food. (See "Capacity of the Stomach," page 46.) Both the amount at a feeding and the strength should *not* be increased at the same time.

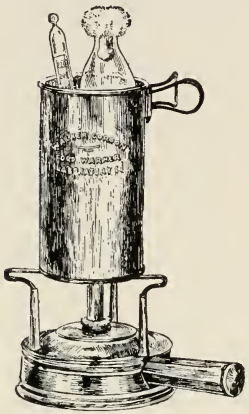


THE HYGEIA NURSING BOTTLE.

Neutralizing Acidity

The acid reaction of cow's milk renders the addition of an alkali necessary. For this purpose bicarbonate of sodium (baking soda) or lime water may

be used (preferably the latter, of which 5 to 10 per cent may be necessary). The lime water also has the important property of making the curds more flocculent and therefore more easily digested. Of the sodium bicarbonate, one or two grains to the ounce will be sufficient. A solution of one drachm of sodium bicarbonate in a quart of water has the same alkaline strength as lime water.



FOOD WARMER AND ALCOHOL LAMP.

If the food is to be sterilized, sodium bicarbonate should be used or the lime water should be added to the tube afterwards. Heating with lime water brings about certain undesirable changes in the milk.

The following formulæ fairly express the composition, amount and frequency of feeding, with the length of intervals, for normal, healthy infants of average weight and development:

Formula 1.

	Proteids; 0 22% Fats; 1.00%	Sugar; 6.50%
First 3 days or Premature.	Cream—(16%)	½ ounce
	Milk sugar	½ "
	Lime water	½ "
	Boiled water	7 "
	Salt	small pinch
	Total	8 ounces

Feedings, 10 to 12; Quantity of each, ¼ to ½ ounce; Intervals, 2 hrs.

Formula 2.

	Proteids; 0.47% Fats; 1.00%	Sugar; 6 75%
1st week.	Cream—(16%)	1 ounce
	Skimmed milk	1 "
	Milk sugar	1 "
	Lime water	1 "
	Boiled water	13 "
	Salt	a pinch
	Total	16 ounces

Feedings, 10; Quantity of each, ½ to 2 ounces; Intervals, 2 hrs.

Formula 3.

	Proteids; 0.58% Fats; 1.50%	Sugar; 6 50%
2nd week.	Cream—(16%)	1¼ ounces
	Skimmed milk	1¾ "
	Milk sugar	1½ "
	Lime water	1½ "
	Boiled water	20 "
	Salt	2 pinches
	Total	24½ ounces

Feedings, 10; Quantity of each, 1 to 2 ounces; Intervals, 2 hrs.

Formula 4.

3rd week.

Proteids; 0.70%	Fats; 2.00%	Sugar; 6.50%
Cream—(16%)		4 ounces
Skimmed milk		2 "
Milk sugar		1½ "
Lime water		2 "
Boiled water		24 "
Salt		2 pinches
Total		32 ounces

Feedings, 10; Quantity of each, 2 to 3 ounces; Intervals, 2 hrs.

Formula 5.

4th & 5th weeks.

Proteids; 0.92%	Fats; 3.00%	Sugar; 6.00%
Cream—(16%)		6 ounces
Skimmed milk		2 "
Milk sugar		1½ "
Lime water		2 "
Boiled water		22 "
Salt		2 pinches
Total		32 ounces

Feedings, 10; Quantity of each, 2 to 3 ounces; Intervals, 2 hrs.

Formula 6.

6th, 7th, 8th weeks.

Proteids; 1.15%	Fats; 3.00%	Sugar; 6.00%
Cream—(16%)		6 ounces
Skimmed milk		3 "
Milk sugar		1½ "
Lime water		2 "
Boiled water		21 "
Salt		2 pinches
Total		32 ounces

Feedings, 9; Quantity of each, 3 to 3½ ounces; Intervals, 2½ hrs.

Formula 7.

	Proteids; 1.40% Fats; 3.50%	Sugar; 6.25%
	Cream—(16%)	7 ounces
	Skimmed milk	4 "
3rd month.	Milk sugar	1½ "
	Lime water	2 "
	Boiled water	19 "
	Salt	2 pinches
	Total	32 ounces

Feedings, 8: Quantity of each, 3 to 4 ounces; Intervals, 3 hrs.

Formula 8.

	Proteids; 1.50% Fats; 3.50%	Sugar; 6.75%
	Cream—(16%)	7½ ounces
	Skimmed milk	5½ "
4th & 5th months.	Milk sugar	2 "
	Lime water	2½ "
	Boiled water	21 "
	Salt	2 pinches
	Total	36½ ounces

Feedings, 7; Quantity of each, 4 to 5½; Intervals, 3 hrs.

Formula 9.

	Proteids; 1.90% Fats; 4.00%	Sugar; 7.00%
	Cream—(16%)	10 ounces
	Skimmed milk	10 "
6th, 7th, 8th months.	Milk sugar	2 "
	Lime water	2½ "
	Boiled water	18 "
	Salt	2 pinches
	Total	40½ ounces

Feedings, 6; Quantity of each, 6 to 7 ounces; Intervals, 3 hrs.

Formula 10.

	Proteids; 2.40% Fats; 4.00% Sugar; 6.00%	
	Cream—(16%)	10 ounces
	Skimmed milk	15 "
9th & 10th months.	Milk sugar	1½ "
	Lime water	2½ "
	Boiled water	12½ "
	Salt	1 pinch
	Total	40 ounces

Feedings, 5; Quantity of each, 7 to 8 ounces; Intervals, 3½ hrs.

Formula 11.

	Proteids; 2.90% Fats; 4.00% Sugar; 6 00%	
	Cream—(16%)	12 ounces.
	Skimmed milk	2 4 "
11th month.	Milk sugar	1½ "
	Lime water	3 "
	Boiled water	9 "
	Salt	1 pinch
	Total	48 ounces

Feedings, 5; Quantity of each, 7 to 9 ounces; Intervals, 3½ hrs.

Formula 12.

	Proteids; 3.40% Fats; 4.00% Sugar; 5.50%	
	Cream—(16%)	12 ounces
	Skimmed milk	30 "
12th month.	Milk sugar	¾ "
	Lime water	3 "
	Boiled water	3 "
	Total	48 ounces

Feedings, 5; Quantity of each, 8 to 10 ounces; Intervals, 4 hrs.

Formula 13

	Proteids; 4.00% Fats; 4.00% Sugar; 5.50%	
	Whole milk	48 ounces
15th month.	Milk sugar	¾ ounce
	Bicarbonate of soda	30 grains
	Total	48 ounces

Feedings, 5; Quantity, 8 to 10 ounces; Intervals, 4 hrs.

Formulae for Normal Infants Only

These formulae are intended only as a suggestive guide in the feeding of *normal* infants according to ages specified. Delicate babies, or those of impaired digestion, should be given the formula for younger infants.

These mixtures may be prepared from 16 per cent cream, skimmed milk, milk sugar, salt, lime water and boiled water.

Sixteen Per Cent Cream

Six ounces of 16 per cent cream may be obtained from a quart bottle of good milk which has stood undisturbed for six hours by siphoning away the lower four-fifths. This 16 per cent cream may also be obtained from a reliable dairyman.

Milk sugar may be bought from the druggist by the pound, or more cheaply at wholesale in five-pound packages.

Measuring Milk Sugar

Accurate scales not being available in most households, the milk sugar must be measured. As different brands vary a little in weight for bulk, it is always advisable to have the druggist weigh accurately portions of one, one and one-half, and two ounces, which may be kept as standards. One of the most convenient

and accurate ways of measuring the amount for a formula is to put the required weighed portion into the graduate, tap a few times, and mark the level by scratching the glass with a file. This mark will show the amount to be used each time the formula is made up.

Tablespoons vary so greatly in size that it is not safe to use them for measuring the sugar. Two and one-half large size tablespoons leveled with a knife will measure about an ounce, but if an ordinary kitchen tablespoon is used, it may take three and one-half leveled to give an ounce. As the milk sugar is the largest constituent of the baby's food, it is necessary that it be measured accurately.

Milk sugar is used because it is more easily digested than cane sugar, and is not so liable to fermentation. Although only about one-half as sweet to the taste, it has about the same nutritive value as cane sugar. In the later months of the first year cane sugar may be substituted for milk sugar, if economy demands it, a smaller amount being used.

Salt is added to promote digestion and to make up the deficiency occasioned by dilution.

Milk Should be Analized

Milk containing 4 per cent of fat should be used in the formulae given. A good milk will have this amount, but the legal standard in many localities is 3 per cent or less, so that it is best to have the milk supply analyzed occasionally. The board of health or the milk commission in many cities will make an-

alyses free, and in the country the dairies will perform the same service for a small charge. If there is 4 per cent of fats present, it is safe to conclude that the proteids are up to standard.

Directions for Mixing

For making up a formula the following directions may not be amiss: As soon as the baby's special bottle of milk is delivered to the house, it should be taken in and placed in the coldest part of the refrigerator. If it is delivered very early in the morning (during hot weather), a small ice box should be provided in which the milkman may place the bottle.

In the country, if the milk is received while warm, it should be strained through absorbent cotton or cheesecloth into a clean quart milk bottle or preserve jar, stoppered, and placed in cold running water for about half an hour, and then put on ice for six hours, or until the cream has risen.

It will be found convenient to keep the vessels, lime water, milk sugar, etc., together on a tray. The one to do the mixing should wash her hands carefully and put on a clean apron. The mixing should be done in a clean place. A copy of the formula to be made up should be at hand.

Siphoning Off the Skimmed Milk

To siphon off the milk, a glass tube should be used, as shown in the illustration.* To start the siphon, fill it full of boiling water by *pouring* water in, place the thumb over the end of the long arm and invert the siphon, lowering the short arm gently to the bottom of the bottle of milk. Remove the thumb and the milk will

* A milk syphon may be obtained through the school for 25 cents.

follow the water out of the tube. It is best caught in another bottle or a 32-ounce graduate. A mark on the receiving bottle showing when 26 ounces have been drawn will leave the 6 ounces of 16 per cent cream in the first bottle, provided the bottles are full quarts of 32 ounces. If the milk is very rich in cream, less than 26 ounces of skimmed milk should be removed.

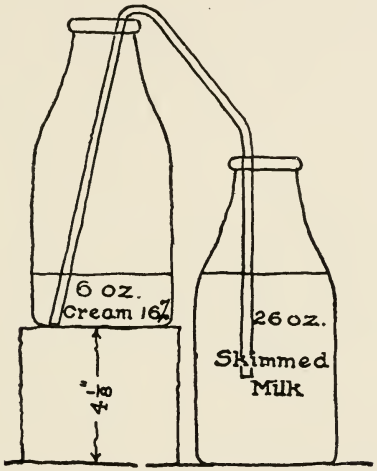
Making Up a Formula

Suppose *Formula 4* is to be made up—the 6 oz. of 16 per cent cream is first mixed to a uniform consistency by rotating the bottle gently; exactly 4 oz. is measured in the graduate and poured into the mixing pitcher. Two ounces of the skimmed milk is then *very carefully* measured in the graduate and poured into the pitcher. Two ounces of lime water is now measured and added to the pitcher; the 1½ oz. of milk sugar is measured in the 8 oz. graduate as described, and the two pinches of salt added. Boiled water is added up to the 8 oz. mark. The mixture is stirred with a clean spoon kept for the purpose until the sugar is dissolved and added to the pitcher. Sixteen ounces of water (making 24 oz. in all) is measured and added to the pitcher and the whole is stirred with the spoon until thoroughly mixed.

If wide-mouthed tubes are used, they may be filled by pouring directly from the pitcher up to the 2 oz., 2½ oz. or 3 oz. marks on the tubes, according to the amount to be given at a feeding. If small-mouthed tubes are used, a glass funnel will be necessary. The tubes are stoppered at once with sterilized, non-absor-

bent cotton, which is kept in some receptacle away from the dust. After stoppering the tubes are placed in a rack and put in the coldest part of the refrigerator. The whole operation should be accomplished as

Keep the Milk Cool



SIPHONING SKIMMED MILK FROM THE CREAM.
If there is a difference in level of about 4½ inches between the two milk bottles, the siphon will stop running with approximately 6 oz. of cream left in the upper bottle, and 26 oz. of skimmed milk in the receiving bottle.

quickly as possible, so that the milk will not have time to become warm. It should be borne in mind that there is always dust laden with bacteria in the air of the cleanest room. The bacteria we are endeavoring to exclude.

Washing Vessels

All the utensils used should now be rinsed first in cold water, then washed in hot soap and water, put

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into a pan of *boiling* water for 10 or 15 minutes, and then inverted. They should not be wiped with a towel, and if washed perfectly clean with plenty of soap will drain clear. The tray should be washed, and after the utensils are drained, they should be placed on the tray and covered with a cloth to keep out dust. The milk sugar should be kept stoppered.

It is apparent that an ignorant, untrained servant cannot be trusted to carry out all these precautions, and that the mixing should be done by the mother or trained nurse.

Change From One Formula to the Next

The importance of increasing the strength as well as the quantity of the food *gradually* should again be emphasized. In changing from one formula to the next stronger, the simplest method of making the transition a gradual one is to add water to the *new* formula in such proportion as to reduce the percentage of proteid to nearly that of the preceding formula. The following may serve as a suggestive guide:

In changing from Formula 2 to Formula 3, add to the *full quantity* of formula 3, the first day 5 oz. of water, second day 4 oz., third day 2 oz., fourth day 1 oz.

Changing from Formula 3 to Formula 4, add 6 oz. of water the first day, 4 oz. the second day, 2 oz. the third day.

Changing from Formula 4 to Formula 5, add 5 oz. of water the first day, 4 oz. the second, 3 oz. the third, 2 oz. the fourth, and 1 oz. the fifth.

Changing from Formula 5 to Formula 6, add 8 oz. the first day, and 1 oz. less during succeeding days.

Changing from Formula 6 to Formula 7, add 7 oz. of water the first day, and 1 oz. less every two days.

Changing from Formula 7 to Formula 8, add 2½ oz. of water the first day, 2 oz. the second day, 1 oz. the third and fourth days.

Changing from Formula 8 to Formula 9, add 10 oz. of water the first day, and 1 oz. less during succeeding days.

Changing from Formula 9 to Formula 10, add 10 oz. of water the first day and 1 oz. less during succeeding days.

Changing from Formula 10 to Formula 11, add 9 oz. of water the first day and 1 oz. less during succeeding days.

Changing from Formula 11 to Formula 12, add 5 oz. of water the first day and 1 oz. less during succeeding days

Changing from Formula 12 to Formula 13, add 8 oz. of water the first day and 1 oz. less during each succeeding day.

Keep Notes

In case the new formula does not seem to agree, the number of ounces of water added should be reduced more slowly. *Carefully written notes should be kept of all changes.*

Cream containing 16 per cent of fat also contains a certain percentage of proteids and milk sugar. Roach gives the following composition:

Composition of 16 Per Cent Cream

	Per Cent
Water	76.7
Proteids	3.2
Fats	16.0
Milk Sugar	4.05

Composition of Skimmed Milk

	Per Cent
Water	92 7
Proteids	3.6
Fats	trace
Milk Sugar	4.6

Use of Whey

Where proteids are not tolerated *whey* (see recipe) may be substituted for the skimmed milk and for the whole or part of the boiled water.

The whey contains the lac albumen (but no casein), the sugar and the salts of the milk. The Walker-Gordon Co. gives the following analysis for the whey which they furnish. It is made from skimmed milk and contains practically no fat.

Composition of Whey

	Per Cent.
Water	93.6
Proteids	1.0
Milk Sugar	4.7
Mineral Matter	0.7

Egg Albumen

If the intolerance for milk proteids persists, the proteid of egg white (see recipe) may be substituted. The white of one egg has the proteid value of eight ounces of skimmed milk.

Composition of White of Egg

	Per Cent.
Water	85.7
Proteids	12.6
Fats	0.25
Mineral Matter	0.59

FOODS OTHER THAN MILK

Other foods than milk may be utilized, to a limited extent, in the dietary of the infant. Of these there are three general classes.

First: Farinaceous substances; such as barley, oatmeal, arrowroot, farina, rice, wheat and bread, preferably in the form of water gruels, and jellies. Starch

Second: Albuminoids or proteids, of which class beef juice and egg white are the best representatives.

Third: Fruit juices, as orange, prune and unfermented grape. Fruit Juices

The first class have, before the sixth month of infancy, but a limited food value, because of the indigestibility of their starchy contents. A partial conversion into sugar may be secured, however, by thorough and prolonged cooking, as in the preparation of gruels and jellies. A still further conversion may be secured by the addition of diatase, as malt and malt extracts, a few minutes before feeding. This changes a certain amount of the starch into dextrin.

Cereal gruels, in some cases, promote digestion of cow's milk by mechanically preventing the formation of dense curds in the stomach. They may be used to replace all or a part of the water of a formula. Gruels

When the proteid of cow's milk is not well borne that most essential constituent may be supplied from raw beef juice or egg white. (See recipes.)

Orange juice, prune juice and unfermented grape juice are very valuable food adjuncts in cases of nutri-

tional depravity. These are especially needed where the infant has been subject to the prolonged use of cooked and pasteurized foods.

Patent Baby Foods

Many of the so-called baby foods contain little more than starch, and on that account can not be too severely condemned for young children; but the practice, somewhat in vogue, of denouncing all patent foods on that account is thoughtless and unjust. There

Percentage Composition of Infant Foods

Food	Moisture	Proteids	Fat	Carbohydrates	Mineral Matter	Remarks
Horlick's Malted Milk	3.9	13 8	3.0	76.8	2.7	A mixture of desiccated milk (50%) and malted wheat and barley. No unaltered starch.
Mellin's Food *	5.7	10.7	0.1	79.1	4.4	A completely malted food. All the carbohydrates in soluble form.
Nestle's Food *	3.6	14.0	5.2	75.1	1.9	A mixture of desiccated milk, partially malted wheat flour and cane sugar (27%). Starch 15%.
Eskay's Food *	1.7	6.7	3.5	87.1	1.0	A mixture of partially malted wheat, egg albumin and milk sugar (54%). Starch 29%, especially treated.
Condensed Milk	62.0	9.1	10.7	15.5	4.3	Unsweetened whole cow's milk. 1 part diluted with 2 parts water gives ordinary milk. Sweetened condensed milk contains about 37% cane sugar.
Dried Human Milk	——	12.2	26.4	52.4	2.1	Analysis by Hutchison

* Latest analyses, given by the manufacturers.

is much to recommend in some of these preparations, since intelligent modification by supplying a deficiency, may convert it into a most valuable adjunct in substitute feeding. Food which would not meet the requirements of nutrition for a long-continued period, because deficient in some essential constituent, may be used *temporarily,* as in weaning, traveling or temporary removal from the breast.

Among the objections to many of the patent foods may be mentioned: small amount of fats; insolubility of their proteids when present; excess of sugar, especially cane sugar; the high percentage of unconverted starch and the fact that all have been cooked.

Medical Supervision in Artificial Feeding

The writer believes that the artificially fed infant should always be under the supervision of a competent physician. Some one has said that it is twice as dangerous to be a baby as it is to have smallpox. The mortality in untreated typhoid is less than half that of artificially fed babies, yet no one questions the necessity for a physician in typhoid. Few regard the physician as out of place at the birth of the infant, yet the mortality during birth is slight compared with that of bottle feeding. The most active function of a physician's life is remedying errors, in attempting to patch up the evil results of mistakes. His highest function is to ward off the error and to prevent the mistakes.

Bottle Fed Babies not in Normal Condition

The infant at the breast is in normal relation with his most imperative need and is seldom under the physician's care. He who substitutes artificial for

natural feeding unnecessarily may be likened to the captain who, in a safe roadstead, slips his cable in the face of a gale and trusts his vessel to unknown waters without pilot, chart or compass.

No Perfect Substitute Food

No method yet devised can take the place of breast feeding. No substance nor combination has been discovered that meets all the requirements of the infant as does breast milk.

The vast amount of study and research of the best minds have evolved as yet towards the solution of this question only a few scientific principles. The application of these to individual cases calls for the best work of the trained physician.

As before said, the most available artificial food for babies, cow's milk, can not be made to resemble that of the mother, and in many instances man's highest skill can not adapt it to the requirements of the infant, though he modify it ever so wisely. How difficult, then, the task of writing formulae for the modification of an indefinite substance (milk) for the feeding of unknown infants, whose unknown requirements are the result of unknown conditions.

Province of the Mother

The supervision of the physician does not lessen the care required of the mother or nurse, nor make it less necessary that she should understand the situation. However wise the advice may be, trouble is almost sure to follow unless the rules and precautions given are followed to the letter.

FOOD DISORDERS

Overfeeding

Overfeeding is responsible for many of the digestive disturbances of infancy. Among the causes of overfeeding may be mentioned irregularity as to time; thirst; perverted taste; improperly balanced or too concentrated a food; too rapid feeding, and general ignorance or carelessness on the part of the nurse. The usual result of *occasional* overfeeding is acute indigestion, with or without vomiting, belching, colic, diarrhoea, curds in stool, restlessness, broken sleep, fever or loss of weight.

Habitual overfeeding may cause dilatation of the stomach with loss of digestive power and all the symptoms of chronic dyspepsia, such as flatulence, colic, constipation or diarrhoea, loss of weight or general mal-nutrition.

Colic

Occasional colic or loose stools or even vomiting may call for nothing more than a temporary diminution of food and a dose of castor oil. In mild cases, the food may be diluted with about a fourth the volume of water, either in the nursing bottle before feeding or when the day's supply is made up. The quantity given may also be reduced somewhat. In returning to the original formulae the change should always be made *gradually*.

Persistent colic may be an indication of excessive proteids, the percentage of which should be reduced to the relief of both colic and diarrhoea, with the disappearance of curds from the stools.

Vomiting

Vomiting, or "spitting up," with or without diar-

rhoea, may be caused by an excess of fat and yield promptly to a reduction of this constituent. If food is not digested fermentation occurs in the bowels, with the formation of poisons, which cause restlessness and fever. This "auto-intoxication" is of frequent occurrence in infancy, but is usually relieved by the correction of the dietetic errors.

Hot Weather Diet

A common mistake is the neglect to modify the food with due regard to the season. Hot weather requires diminution in the fats and proteids (from one-eighth to one-half), so that what constituted a well-balanced food for the winter months is not suitable for the heated term. In hot weather infants need more water and frequently cry from thirst rather than hunger.

The long-continued use of food deficient in fat is often productive of rickets. Scurvy may be developed by the habitual use of cooked food, while mal-nutrition is the result of chronic indigestion.

The prevention and correction of these disorders lies in proper feeding (See "Essentials.") Their symptoms will be discussed in the section on *Children's Ailments.*

Do Not Experiment

The practice of experimenting on the baby with all kinds of food—patent and otherwise—is a most pernicious one. Nature takes some time to rectify digestive disturbances, and a slight improvement at each feeding is all that can be expected. If the simple changes suggested do not give relief after a day or two, the physician should be consulted.

FOOD AFTER THE FIRST YEAR

Taking Away the Bottle

Bottle feeding is rarely necessary after the twelfth month. The child may be gradually taught to drink from a spoon or cup. Where the baby is delicate the bottle may be used until the fifteenth month.

The eruption of teeth, the increase in the salivary, gastric and pancreatic secretions give not only greater power of starch and proteid digestion, but also the ability to masticate some solid food.

Semi-Solids

Semi-solids must be introduced gradually into the dietary, milk remaining the principal food. Cream is required particularly where there is a tendency to constipation. Until the eighteenth month little change should be made except the addition of gruels, meat broths and cracker or stale bread soaked in milk. Five feedings in the 24 hours during the second year are sufficient for a healthy child.

The following dietary is intended only as a *suggestive guide.* Variety at this age is *not necessary,* but a choice is designated by the letters *a, b, c.*

Dietary from 12 to 18 Months

First Meal. 6 to 7 A. M.

a—Glass of warm milk containing a little stale bread or rolled cracker.

b—A porridge of well cooked (at least two hours) cereal with milk.

c—A little soft egg (poached or boiled) with stale bread crumbs and a glass of milk.

SECOND MEAL. 10 A. M.

Glass of warm milk.

THIRD MEAL. 1 TO 2 P. M.

a—Stale bread soaked in gravy from the roast or steak. Milk.

b—Soft egg, a little zwieback, glass of milk.

c—Toast soaked with beef juice (see recipe), glass of milk.

FOURTH MEAL. 5 TO 6 P. M.

Glass of milk or milk with cereal jelly. (See recipe).

FIFTH MEAL. (If necessary late in the evening or night.)

Glass of warm milk.

Dietary from the 18th to 24th Month.

FIRST MEAL. 7 A. M.

a—Warm milk with stale bread or buttered cracker.

b—Cereal porridge with milk and cream.

c—Glass of milk, soft boiled egg with bread and butter.

SECOND MEAL. 10 A. M.

a—Bread and milk.

b—Milk from oyster stew and cracker.

c—Milk-toast.

THIRD MEAL. 2 P. M.

a—Mashed potatoes with dish gravy and a glass of milk

b—Mutton, beef or chicken broth thickened with rice or barley, bread or cracker and milk.

c—Beef juice on toast, rice or tapioca pudding. With this meal may be given a little well baked apple pulp or stewed prune pulp and juice.

FOURTH MEAL. 5 TO 6 P. M.

Bread and milk, or bread with butter and milk.

Milk may be given during the night if the baby seems hungry.

Dietary for Third Year

First Meal. 7 to 8 A. M.

a—Cereal with plenty of milk and cream.
b—Soft boiled or poached egg with toast and milk.
c—Meat jelly with bread or cracker and milk.

Second Meal. 11 A. M.

Bread and milk, meat, or clam broth with cracker.

Third Meal. 2 P. M.

a—Broiled scraped beef with buttered baked potato. Milk.
b—White meat of fish or fowl, mashed potato with bread and butter.
c—A little finely cut steak or roast, creamed potato or boiled rice and milk.
Light pudding, junket, stewed fruit or a little ice cream may be added to the above.

Fourth Meal. 6 to 7 P. M.

a—Bread and butter, glass of milk.
b—Cornmeal mush and milk.
c—Baked apple, graham crackers and milk.

Fruit

During this year the child should occasionally have a little orange juice, scraped raw apple, grape pulp free from seeds, ripe banana grated fine, ripe peach or pear.

At the Family Table

After the third year the child is presumably sitting at the family table and will, if not well managed, insist upon having things not good for him. Many systems are hopelessly impaired for want of parental tact and firmness at this time. If the child is once taught that he may not choose for himself, he will gladly

accept the food suitable to his age and condition. In planning the meals for a family containing several young children consideration should certainly be given to their requirements.

Foods Not Advisable

The following articles are best avoided during early childhood:

Condiments or highly seasoned food.	Cake.
Pork.	Hot breads.
Fried meats.	Cucumbers.
All fried foods.	Corn.
Griddle cakes.	Doughnuts.
Cabbage.	Doughey puddings.
Tomatoes.	Rich puddings.
Pastry.	Over or under ripe fruits.
Dumplings.	Raw celery.
	Turnips.

Stimulants

It goes without saying that children should never be allowed tea, coffee, beer or other stimulants.

Nuts and confections should never be allowed on an empty stomach.

General Rules

1—Regularity as to meals is of prime importance.

2—Thorough mastication is absolutely essential to perfect digestion.

3—Rapid eating invariably induces dyspepsia.

4—Fluids are essential to good digestion, but the food should never be *"washed down."*

5—A judicious balance must always be maintained between the five food constituents, viz.: proteids, fats, sugar, salts and water.

FOOD RECIPES

Beef Juice

Salt and slightly broil small pieces of thick, lean, round steak and while hot express the juice with a meat press or a lemon squeezer. The juice may be given cold or with the addition of a little warm water. *Hot* water coagulates the albumin. Made in this way the juice contains from 5 to 6 per cent of coagulatable proteids and from 2 to 3 per cent of "extractives"—nitrogenous substances without nutritive value, but stimulating to the digestive organs.

Beef Tea

To 1 pound of lean chopped or minced beef add 1 pint of cold water. Stir and let stand for 2 hours; then let simmer for 20 minutes. Do not boil. Strain and when cool remove all fat. When ready to use warm and season. Best prepared in double boiler.

Mutton Broth

Over 1 pound of lean meat, cut in small pieces, pour 1 quart of cold water, let stand in cold place for 3 hours, then cook slowly down to 1 pint. Cool, skim off fat, and strain.

Veal, chicken or beef broths may be made in the same way.

Meat Pulp

By scraping with a dull knife separate the meat pulp from the fiber. Season pulp, make in small cake and slightly broil, or may be salted and eaten raw.

Whey

Heat 1 quart of *fresh* milk luke warm; into this gently stir 2 teaspoonfuls of Fairchild's essence of pepsin; let stand about twenty minutes or until firmly coagulated, then with a fork break up the clot and strain through fine muslin without pressure. Bring the whey thus obtained to a boil to kill the ferment, then cool and keep on ice.

Albumin Water

Put the white of one egg in a saucer and cut (do not beat) until fine with knife and fork. Add 1 cup cold boiled water and strain through cheesecloth. Keep on ice until ready to use. If desired a tiny pinch of salt may be added.

Lime Water

Drop a piece of unslaked lime as large as a walnut into a vessel containing 2 quarts of pure filtered water, stir thoroughly and allow to settle. Pour off the clear solution into bottles, which should be kept corked.

Oat Jelly

Soak half a cup of coarse oatmeal in a quart of cold water for 10 hours. Boil down so as to make a pint and while hot strain through fine cheesecloth. A jelly is formed when cold. It should be kept on ice until needed.

Wheat and rice jelly can be prepared in the same way.

Barley Water

Put 1 tablespoonful of washed pearl barley in a saucepan with a quart of water; boil slowly down to 1 pint; strain.

Barley Jelly

Boil slowly down to a pint, 1 quart of water and 3 tablespoonfuls of pearl barley; strain and let stand until jellied.

Peptonized Milk

In 4 ounces of boiled cold water, dissolve a tablet containing 15 grains of bicarbonate of soda and 5 grains of pancreatine, to which add 12 ounces of milk. Set vessel containing this mixture in a pan of water at a temperature of 115°F for from 8 to 10 minutes. Cool quickly by placing in running water and keep on ice until used. Use double boiler for making. To completely peptonize the milk heat for two hours. It then has a bitter taste.

Dropped Egg

Drop a fresh egg into enough boiling milk to cover; remove from milk as soon as the white is set; salt and serve hot with cracker or bread crumbs.

Dried Bread

Cut bread at least 24 hours old in thick slices; put in slow oven and bake until thoroughly dried. (20 to 30 min.)

Kumyss—(Holt)

1 quart of fresh milk, half an ounce of sugar, 2 ounces of water, a piece of yeast cake at least half an inch square; put into wired bottles, keep at a temperature between 60 and 70 F. for 1 week, shaking 5 or 6 times a day; put on ice.

TEST QUESTIONS

The following questions constitute the "written recitation" which the regular members of the A. S. H. E. answer in writing and send in for the correction and comment of the instructor. They are intended to emphasize and fix in the memory the most important points in the lesson.

CARE OF CHILDREN

PART II

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between the answers for the notes of the instructor. *Use your own words* and answer fully. Read the lesson paper a number of times before attempting to answer the questions.

1. What is the best food for the baby and why?
2. What is the effect upon the child of too much fat in the milk? Too little?
3. What are the indications for early weaning?
4. Why should the baby not nurse the breast of a sleeping mother?
5. Give and explain four rules for nursing.
6. Give in detail the difference between mother's and cow's milk.
7. What may be done to increase the percentage of fat in breast milk? The percentage of proteid?
8. Give some of the causes of impairment of mother's milk.
9. How should the baby be weaned?
10. When the proteids of cow's milk are not tolerated, what may be substituted for them?
11. Why give a baby water? When? How? How much?

12. State general objections to the patent baby-foods.
13. What is safe milk? How should the baby's milk be cared for in the home?
14. What governs the quantity given at a feeding? The strength of the food?
15. Give the causes and effects of over feeding.
16. What are the principal dangers in feeding a baby cow's milk?
17. What is meant by a balanced food?
18. Why are special precautions necessary to keep the baby's food as nearly sterile as possible?
19. What can you say in regard to feeding during the second year?
20. How would you alter the food of a young baby in very hot weather?
21. What may the mother or nurse safely do if the baby has indigestion?
22. Mention new facts you have learned from this lesson.
23. What questions have you to ask?

Note.—After completing the test, sign your full name.

CHART SHOWING MORTALITY IN LARGE CITIES BY MONTHS AND AGES

From Circular of Illinois State Board of Health on Infant Feeding

UNIVERSITY OF CALIFORNIA

CARE OF CHILDREN

PART III

The Sick Child

SYMPTOMS OF DISEASE

The sick child should, of course, always be under the physician's care, but the mother can aid greatly by giving him an intelligent account of symptoms. The mother knows (or should know) her child much more thoroughly than can any outsider and it is on her carrying out of directions faithfully and intelligently that the recovery of the sick child must depend.

Symptoms in Health

In order to recognize the symptoms of disease it is necessary to become thoroughly familiar with the normal, healthy infant. This is accomplished only by careful, conscious observation. Attitude, both sleeping and waking; facial expression, movements of extremities, trunk, head and eyes; sounds, both articulate and inarticulate; respiration, frequency and regularity; color of the skin and condition as to temperature and moisture, are all significant of sickness or health.

Restlessness or apathy, if but slight, may be estimated only by comparison with the baby's normal condition.

A few of the most easily recognized indications of acute disorder may be mentioned, such as sudden loss of appetite, excessive thirst, unusual drowsiness, languor or fretfulness, all of which may indicate intoxication.

The screaming infant may give some hint as to the location of his pain by chewing his fingers when the mouth or throat is inflamed; by carrying his hand to his head or pulling at his hair when the ear or mastoid region is the seat of trouble; by writhing motions of the body with drawing up of the knees which indicates abdominal pain, whether of the stomach or bowels or bladder.

Breathing The rapid breathing may indicate pulmonary disorder; the terminal expiratory moan, pneumonia; or the restricted, expiratory grunt may mean an abdominal pain or pleurisy, the short suppressed cough ending in a cry may indicate pneumonia or pleurisy.

Headache is often indicated by puckering of the eyebrows and intolerance of strong light, while throwing the head back with rigidty of the neck or continuous head rocking are common symptoms of meningitis or brain fever. Twitching of the face or of the extremities may be the precursor of convulsions.

Fever The flushed face of fever is too obvious to be overlooked and the whiteness about the lips and nose is always indicative of nausea or irritation of the intestinal tract, whether from indigestion or worms, and usually precedes vomiting.

Crying when handled usually indicates some local tenderness in trunk or limbs and may be due to injuries, such as dislocations, fractures or contusions; or to the tenderness of rickets, scurvy, syphilis, rheumatism or inflammation of some joint. Copious sweat-

ing during sleep, especially about the head, is always suggestive of rachitic malnutrition. Disinclination or inability to move a limb should never be overlooked as it may mean a grave disorder, either in the affected limb or in the central nervous system. Refusal to nurse may be due to trouble in the mouth, throat or nose which parts should be frequently examined.

THE CRY

There is no such thing as a meaningless cry. It is only a question of interpretation. The cry is the infant's only means of making his wants known.

No Meaningless Crying

Most welcome is the baby's first cry induced by the discomfort of his new surroundings and its vigor and volume may indicate vital capacity. A little lusty crying in the first days is good for the baby as thereby deep inspiration is induced which more fully inflates the lungs and establishes more completely the new function of respiration. Some babies never entirely overcome the adhesions of the bronchial tubes and air cells, a part of the lung remaining unused.

The cry should be clear and distinct and any deviation from its normal tone is an indication of disorder. Whatever the cause of crying it is usually tearless before the third month.

Hungry Cry

Hunger is usually expressed by crying, but it is a great mistake to conclude that because the child was quieted by the nipple he was therefore hungry. He may have been thirsty, or the warm milk may have

temporarily relieved the pain due to indigestion. In either case the food will harm him. Water was what he needed.

Most often a baby cries because he is uncomforable —the diaper may need to be changed; the clothes may need straightening out, he may need a change of position, or he may be cold. There is such a thing, too, as the crying habit, which over-anxious mothers help to establish by holding the baby, rocking, singing, walking, coddling or nursing at the first intimation of restlessness, however transient if left alone.

Persistent Crying

A persistent cry, if not due to hunger or thirst, is indicative of pain, as from pin prick, itching from bites, eruption, eczema. Earache causes intense pain. Paroxysmal crying may mean colic or bowel cramps, and ceases when the gas moves. Usually with this pain the feet are drawn up and the belly is distended. Pleurisy or tenderness of rickets causes baby to cry when lifted by the arms or chest. Tenderness about legs would suggest rheumatism or scurvy.

Whining

Peevish whining indicates poor health and general discomfort. Brain inflammation is often indicated by a shrill piercing shriek uttered at long intervals. Short suppressed cry occurs in lung inflammation, especially following coughing. Sudden screaming at night suggests night terrors or bad dreams. Hoarse croupy voice points to the larynx, and a nasal tone to stoppage of nose and upper throat. Mouth disorders cause fretfulness and crying when anything is

put into the mouth, while cry after swallowing suggests sore throat.

The baby may cry when passing urine due to tight foreskin or the passage of brown uric acid sand, which may be found staining the diaper. If the child frowns while crying or fretting and avoids the strong light, headache is probably the cause.

COLIC

Causes

Colic is usually due to the pressure of gas in the bowels, one of the results of indigestion. Sudden and violent crying, distended abdomen, alternate drawing up and straightening of the legs, which ceases with the expulsion of gas by mouth or anus, usually indicate colic. This colic is often due to too frequent or too copious feeding, hence the great mistake in quieting the cries of the colicky baby by more feeding. Some babies are especially prone to colic and must be fed with extreme care.

Again babies are colicky while showing no other evidence of dietetic error. In these cases the attacks may be due to chilling of the surface of extremities. Great care, therefore, is necessary in maintaining proper warmth by suitable clothing, especially of the hands and feet. (See baby bag, page 22.)

Uric Acid Colic

Another form of colic is caused, as before mentioned, by sharp uric acid crystals in the kidneys and urinary tubes.

Simply changing the position, as holding the baby over the shoulder, is often effective in expelling the

Treatment of Colic

gas. Gentle massage of the abdomen is helpful. Hot carminative teas, as peppermint, anise, camomile and catnip, with a grain or two of bicarbonate of sodium, may relieve the pain, or in case of exhaustion as indicated by cold or blueness, 2 or 3 drops of brandy in a little water sweetened with milk sugar may be added. Dry heat applied to the extremities and abdomen by means of hot flannel or water bag with gentle

RUBBER CATHATER.

massage of the abdomen will assist. A warm high enema or a rubber tube (see Medicine Chest) introduced and left in the bowel for a few seconds may promote the expulsion of the gas. Where colic is persistent or of frequent occurrence the physician should be consulted with regard to a change in the diet.

CONSTIPATION

Constipation is so common during infancy that some physicians have regarded it as normal to that period of life. While not agreeing with that opinion, it is apparent that certain anatomical and physiological

peculiarities of the infant's intestinal tract predispose to constipation.

Water and Cream

Occasonally it may be relieved by the giving of water between feedings. As one of the functions of fat in the food is to promote bowel movements much good may result from the administration of a little cream, properly diluted, after nursing, or by the increase of this element in the baby's bottle, if he is artificially fed. For the same purpose a few drops of olive or cod liver oil, which babies take readily, may be given after each meal. Care must be taken not to develop fatty diarrhea or stomach intolerance with up spitting or vomiting as a result of fat indigestion.

Massage

For older infants and children molasses taffy given after food has a laxative effect and much benefit may be derived from fresh fruits and fruit juices given regularly when tolerated.

At all ages daily gentle massage of the abdomen to stimulate the peristoltic action of the intestine should never be neglected with children having a tendency to constipation. To be most effective the abdomen should be stroked and kneaded gently and firmly, following the course of the large intestine, namely, upwards on the right side, across above the navel and downwards on the left side towards the groin.

Coarse Food

Where the food is concentrated and quickly absorbed, constipation calls for coarser and more bulky food so that older children should be given coarsely

ground cereals, as cracked wheat, corn bread, graham bread, also fruits, as grapes with the seeds, figs and stewed prunes.

Drugs

The frequent use of drugs for constipation should be discouraged and should rarely be resorted to except by the advice of the family physician. In obstinate cases the bowels may be relieved by an occasional enema of soapy water or sweet oil.

HARD RUBBER INFANT SYRINGE

Regularity

Regularity is most important. As stated on page 40 this may be taught to infants at an early age with, perhaps, the assistance of a "suggester" in the form of a piece of soap whittled to a point. With older children a fixed time (preferably after the breakfast) for daily defecation should be established. Thus, and by attention to the diet, any tendency to constipation may be overcome and many grave disorders of later life obviated.

SUMMER DIARRHEAS

Summer diarrheas are most prevalent and fatal during the periods of infancy and early childhood, the greatest susceptibility to this disease being found between the ages of six and eighteen months, which time the death-rate is many times that at any other

age, hence mother's well-known dread of the baby's second summer.

In children of all ages a transient form may occur at any season, with decided predilection, however, for the heated term. In midwinter occasional attacks of severe, although usually transcient, diarrhea without fatal tendency are seen, but it is in the summer months that intestinal disorders, with diarrhea as a common symptom, are most fatal. The high rate of mortality among infants and children during the summer months, resulting from disorders of which diarrhea is an accompaniment, exceeds that of all other diseases dur-

Mortality

BULB INFANT SYRINGE

ing the same period. Nearly 90 per cent of the deaths from this cause are among artificially fed babies.

The immediate cause of summer diarrhea is thought to be the presence of great numbers of certain bacteria found in unclean and improperly cared for milk.

Onset of Diarrhea

The onset is sometimes sudden, being ushered in by a convulsion, vomiting and diarrhea. There is usually high temperature, thirst and nausea which makes the infant snatch at food but push it quickly aside as soon as a few mouthfuls have been swallowed. Restlessness

is nearly always present. The stools may change suddenly or may be two or three days in changing from the normal in frequency and character. There may be a great deal of colicky pain.

Vomiting

The infant while apparently in perfect health may develop vomiting, the matter ejected being at first the contents of the stomach but little changed—highly acid or in dense curds; this is soon followed, however, by a watery, slimy and rarely by a biled-stained fluid, less acid or even alkaline in reaction. Diarrhea frequently accompanies and invariably follows the onset of the disturbance. The first stools may be nearly normal but they quickly change, showing evidence of fermentation and later on putrefaction. Finally they become watery and may be of a brownish or greenish color. The odor of the stool varies from the normal sour to intensely putrid and later to a sickening musty smell.

Drain of Fluids

The infant, apparently well nourished and playful, quickly shows signs of systemic disturbance in fretful, peevish irritability and restlessness, with head rocking, anxious facial expression, persistent whining cry, fever, dry mouth and softened flabby tissues. The depressed fontanel, sunken, lusterless eyes, sharply defined temples, drawn features with the intense thirst all give evidence of the great drain of fluids. The abdomen, at first distended with gas, may soon become flabby and depressed and the extremities cold, although the rectal temperature may be from 103° to

106° F. Convulsions may usher in the attack, follow the initial vomiting by a few hours, appear only at the final stage or occasionally they may not develop. Within twenty-four hours from the onset, and frequently earlier, the stage of collapse is reached, with pallor and coldness of the surface, though the internal temperature may be high. The restlessness soon subsides into stupor with shallow breathing, collapsed veins, failure of pulse, half closed filmy eyes and death occurs in convulsions or from exhaustion.

Acute Poisoning

This picture presents symptoms of acute poisoning from the stomach or intestinal tract occurring in a state of apparent health and terminating fatally in from twenty-four to forty-eight hours.

Though the well-nourished infant is not exempt from this form of acute poisoning it occurs with much greater frequency among those who show evidence of malnutrition.

Cholera Infantum

Acute summer diarrhea is frequently but improperly called *cholera infantum*. Fortunately the true cholera infantum (caused by a specific germ) with its almost invariably fatal termination is by no means common.

Mild Cases

The commonest form of summer diarrhea is the result of acute indigestion usually caused by improper or impure food or overfeeding. Not infrequently these attacks of vomiting and diarrhea are relieved by the giving of one or more doses of castor oil and the withdrawal of food for twenty-four hours. In such cases the diet should be resumed very gradually, be-

ginning with small quantities of white of egg water, barley water, strained broth or weak malted milk.

After Effects

A prolonged attack of summer complaint rarely leaves the child free from evidence of retarded development, which in many instances is never fully compensated. Perhaps the most important effect of severe summer complaint upon the survivors is the feeble resistance to infection from lowered vitality, so that the danger from contagious diseases is greatly increased.

It is needless to say that the mother's immediate duty is to summon her physician upon the appearance of the first symptom of summer diarrheas.

ABNORMAL PASSAGES

The normal passages of the infant have been described on page 77, and various abnormal stools have been mentioned in connection with other disorders, but it may be well to summarize here. Like vomiting, any divergence from the normal in the appearance of the stool is a sign of warning. They should be kept for the inspection of the physician.

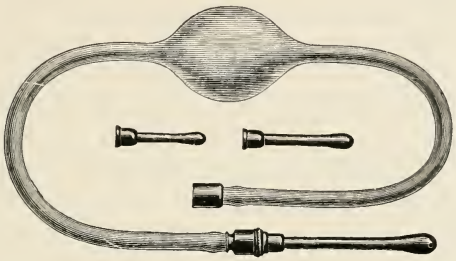
Stools may be abnormal in frequency, consistency, color and odor. During the suckling period the baby's stools may vary in frequency from one to six daily without apparent departure from health, the average probably being three movements in the twenty-four hours.

Variations in the quantity and quality of food in-

gested may cause variations in the quantity and frequency of the discharges which, if normal in color and consistency, need occasion no anxiety.

Color

Breast or exclusive milk feeding gives a light color to the evacuations, varying from a canary to a cream. As before stated, the normal consistency of the suck-



JOINTLESS BULB SYRINGE.

ling's stool is about that of thin batter and is smooth and homogeneous throughout. But little gas is present and the normal odor when freshly voided is slightly sour and not especially offensive.

If cereals, starch, sugar or proprietary foods enter largely into the dietary the stools will be darker, ranging from orange to brown with a greater tendency to gas formation and a disagreeable odor.

Odor

Stools are abnormal when they have a putrid odor suggestive of decomposition; when they are bubbly or yeasty, suggestive of fermentation; when they are watery or contain blood or mucus; when they are

heterogeneous in character; when they are acrid and irritate the anus and skin of the buttocks; when they are green or variegated in color or gray and tough or putty like; when they are hard and lumpy like marbles coated with slime or when they are dry and crumbly, either dark brown, pale gray or white.

Mucus

Mucus is normally present in the discharges, but it is only when irritation of some part of the mucous membrane of the digestive tract has caused an extra abundant flow that it becomes visible. Curds in the passages indicate incomplete digestion, the causes of which are many and sometimes hard to determine. The quantity of food may be too great, or it may be too strong, it may be taken too rapidly, too often, too cold, there may have been chilling of the baby or too much excitement, and so on.

Although some of these conditions may be remedied by the judicious use of castor oil and slight changes in diet, or manner of feeding, they all suggest the advice of the physician, before the underlying causes lead to disorders which may become obstinate.

RICKETS MALNUTRITION AND SCURVY

Rickets (rachitis), *Malnutrition* (marasmus) and *Scurvy* (scorbutus) are essentially nutritional disorders, and as such depend both for their treatment and cure largely upon proper feeding.

The rickety child shows a constitutional perversion of development which, if not arrested, may lead to ac-

tual deformities. There is lessened resistance to disorders of an infectious nature, hence a marked tendency to catarrhal conditions of all the mucous tracts. Early deaths from acute diseases are frequently due to the feeble resistance of the rickety constitution. Rickets is oftenest seen in children between the ages of six months and four years, though some of its effects are visible throughout life.

Three groups of symptoms and signs stand out preeminently as rachitic.

Nervous Symptoms

First. The nervous system shows instability; there is fretfulness, irritability and intellectual precocity. Tendency to spasmodic seizures is sometimes marked. A form of general spasm, known as "tetany" being peculiar to the rachitic infant. So, also, the crowing spasms so frequently mistaken for croup are essentially rachitic. The bright, fidgety child who runs on his toes and the head-sweating, restless, cover kicking, sleep moaning infant suggest the same rachitic disturbance of nerve function.

Muscular Development

Second. The muscular system shows tardy development in strength and remains flabby, so that the infant is late in learning to stand or walk and does not sit erect. Curvatures of the spine frequently show the inefficiency of the muscles to support the trunk. The child, meanwhile, may appear to the uninformed as well nourished; in fact, may be *fat* or *overfat* with pin-cushiony pads on the top of his feet and the back of his hands. His inability to stand is frequently attributed to his great weight.

Bony Indications

Third. This group consists of signs induced by the peculiar retardation of bone growth, such as late closure of the fontanel, square shaped skull, with lateral ridges and bulging forehead, very late and irregular dentition, enlargements at the ends of the long bones showing prominently above the wrist joint and at the ends of the ribs where they join the cartileges of the breast bone. These nodules extend from the upper part of the chest in two receding lines downward and outward like an inverted V and from their resemblance to beads are known as the rachitic rosary. The bones of the rachitic are slow in hardening, hence their ready bending under weight, or pressure resulting in bow legs or knock knees. The chest, too, in later life shows permanent deformities and the "pigeon breast" is a lasting witness to a rachitic infancy. Babies fed on good breast milk very rarely show rickets.

Successful treatment depends upon the recognition of the earliest rachitic symptoms in their incipiency, namely, those of the first group. The physician should be consulted early, as too often this condition is neglected until the third group or bony changes are well under way.

Rachitic infants often show large abdomen with narrow chest and a marked flaring of the lower border of the ribs. They are especially prone to digestive and respiratory disorders and frequently show signs of tenderness about the chest and trunk when lifted.

Since a paucity of fat in the food is largely responsible for this disorder that constituent should be freely, though judiciously, supplied, while the inert starchy constituents and the excessive fattening and gas forming sugars should be reduced. Meanwhile the physician may endeavor to secure a better supply of earthy salts for the deficient bone forming constituents.

Malnutrition

Marasmus is a special term applied to that general form of malnutrition which seems to be seated upon an inherited or inherent vice of nutrition. It goes without saying that if the feeding of a normal baby requires judgment that of the marantic infant will exercise the highest skill of the ablest physician. "Weakly from birth" is the common expression applied to these babies whose death could be ascribed to no definite disease. Of course, malnutrition may result from malhygiene in what would otherwise prove to be a normal infant, and rachitis, one of the results, not only of improper feeding but also of bad environment as to pure air, sunlight and warmth, plays no small part in the production of marasmus.

Feeding

No one may prescribe the exact line of feeding or treatment for an unseen case of malnutrition. Since no two marantic children present the same specific disturbances. There is usually the extreme emaciation which gives the infant the appearance of senility. The rheumy lack luster eye, the weazened face, feeble wail and voracious hunger, presents a vivid picture of starvation, while the large abdomen and frequent foul

smelling stools with or without vomiting emphasizes the need of most careful feeding. How to do this is the special problem for the doctor in each individual case. That any intercurrent infection should speedily terminate the existence of the marantic infant is not surprising.

Scurvy

Scorbutus is a disease occurring only in infants fed continuously on cooked food and is never seen in the baby fed exclusively at the breast. The modern tendency or fad for artificial baby foods and sterilized milk is largely responsible for the increasing frequency of this disorder in recent years.

Scorbutus is so eminently a food disorder that no treatment is necessary other than the proper change in diet. The earliest symptom is crying when the infant is handled as in bathing, changing, dressing, etc., and the nurse may discover that it is the legs, especially the thighs, that are tender to the touch. Sometimes a swelling is observed about the inner or back part of the thigh, above the knee, with a red or blue discoloration as from a bruise. Frequently the swelling is marked and the limb so tender that rheumatism is suspected. Black and blue spots are occasionally seen on different parts of the body or limbs, the result of ordinary handling. The absence of fever (the temperature is usually subnormal) excludes rheumatism and ordinary inflammations. Later the skin shows purple spots due to "blood settling," and sometimes bright red spots, the size of a pin head, under the skin as though a little artery had leaked.

The baby takes nourishment poorly and may have indigestion with diarrhea. The inside of the mouth is dark red, the swollen, spongy gums bleed readily upon pressure. Occasionally blood is vomited which had previously been swallowed from the mouth. Later still, hemorrhages may occur from any mucous tract and the stools show blood in clots like liver or changed to the appearance of coffee grounds. Without relief death soon follows.

Treatment

For treatment cooked food must be replaced by something raw. A teaspoonful of orange juice, diluted, may be given 5 or 6 times a day. Raw milk properly modified, raw beef juice; the white of egg will, if not too late in its administration, bring about a remarkable change.

COLDS

No Germs No Colds

Ordinary colds are the infections from the ever present micro-organisms which cause catarrhal inflammation of some mucous tract when normal resistance is lessened. Lessened resistance may be due to lowered temperature from exposure, from over fatigue, excitement, loss of sleep, mal-nutrition or indigestion. Also from over-feeding, occasional or habitual. Impure air, also, lowers vitality and invites infection.

Acute catarrh (acute cold) may affect the mucous membrane of the nose (Rhinitis); mouth (Stomati-

tis); the middle ear (Otitis); the eyes (Conjunctivitis); the pharynx (Pharyngitis); tonsils (Tonsillitis); larynx (Laryngitis); bronchial tubes (Bronchitis); stomach (Gastritis); bowels (Enteritis); large bowel (Colititis or Dysentery); bladder (Cystitis); or the genitals (Urethritis, Vaginitis or Vulvitis).

Common Cold

Catarrh rarely is confined to a single area but shows a tendency to extend along the continuous mucous lining to adjacent tracts. Repeated acute attacks tend to become chronic under neglect and low vitality. The secretions or discharges from any catarrhal tract will positively infect another which is susceptible, hence their prevalence and the term "common cold." *No cold is trivial. All colds, with discharges, are contagious.*

SORE THROAT

Frequent Symptom

Sore throat is always due to infection, and though it may prove trivial it should never be so regarded, as it is frequently the forerunner of a most grave disease. No physician ever fails to examine the throat of a sick child, and the mother should always do so. The tonsils are very commonly the seat of disease from which infection readily gains access to the blood and system. Recurrent attacks of acute tonsillitis result in permanent enlargement of these structures with increased tendency to acute attacks, and absorption of poison which causes enlargement of the neck glands.

The throat may become nearly closed, breathing interfered with, voice is changed and relief is found only in removal of the tonsil by the surgeon.

Anarchist's Den

The space above the tonsils, behind the soft palate and at the top of the pharynx, is most important. It may well be called the *anarchist's den,* for here hidden

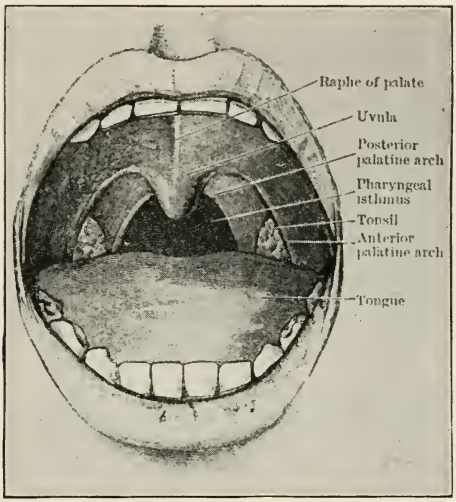


DIAGRAM OF THE MOUTH.

The "Anarchist's Den" is above the "Pharyngeal Isthmus"

from sight more dangerous infections are cultivated than in any other part of the body. It is called the "post-nasal space." Into it open from in front the passages from the nose; from the sides, the tubes from

the middle ears; and from below, the upper end of the pharynx. It is warm, moist, dark and ventilated, an ideal place for the growth of micro-organisms which find in the catarrhal secretions of its mucous lining their ideal food. All nasal catarrhs extend to this space, and the hawking and spitting is due to accumulations here.

Adenoids

Repeated attacks of catarrh (cold in the head) cause soft warty growths, called Adenoids, or "the

AN OIL ATOMIZER

third tonsil," which sometimes fill this space, blocking the ear tubes, causing ear disease and deafness, shutting off the air and forcing the child to breathe through the mouth with snoring in sleep. These adenoids give to the voice a nasal tone, change the shape of the face, raise the roof of the mouth which gives the child a stupid expression and ultimately affects both mind and body. The only cure when well advanced is in removal by the surgeon.

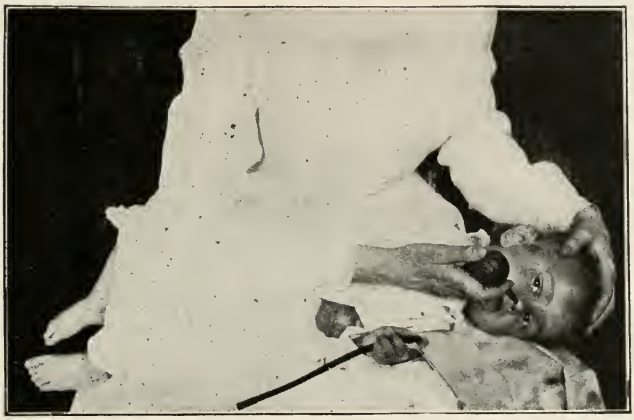
Care of the Nose

The early habitual care of the nose, naso-pharynx and throat by sprays and washes will do much to pre-

vent the numerous ills due to the neglect of this important area.

Oil Atomizer

With a child subject to colds, the oil atomizer should be used daily, night and morning. Alboline with some



GIVING A NASAL DOUCH.

medication such as menthol will be prescribed by a physician. The formula may need to be weakened at first by adding plain alboline until the child becomes accustomed to the treatment

CROUP

Kinds of Croup

There are two forms of croup, spasmodic and diphtheritic. The first form occurs usually at night. The child may or may not have shown signs of illness before going to sleep. Frequently he has been troubled

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with a cold and some hoarseness during the day. Suddenly he is awakened with a barking, metallic (croupy) cough and may sit up struggling for breath. He may have noisy inspirations with all the symptoms of impending suffocation. The doctor is hurriedly summoned, but ere his arrival the paroxysm has passed and the child is sleeping with little evidence of disturbance, or the attack may recur three or four times in the night. Usually the second night sees a return, although he has spent the day comfortably. A return on the third night is not uncommon but with lessened severity. Children rarely die in these attacks, as the suffocation relieves the spasm of the larynx, allowing the air to enter freely again. Some children are "croupy" while others are exempt. Cold and dampness are the usual exciting causes. The attacks are commonest from 2 to 3 years and are rarely seen after the sixth year.

Emetic for Croup

For croupy children an emetic (see Medicine Chest) should be kept in the house and a dose administered before sending for the doctor.

Diphtheritic croup is laryngeal diphtheria, one of the diseases most to be dreaded. It may complicate a previously existing diphtheria of the throat or nose or the disease may make its first appearance in the larynx. The symptoms are continuous and increasing air hunger with great restlessness and weakness. A physician should always have the case in charge with the assistance of a trained and experienced nurse.

TEMPERATURE

Cause May Be Slight

Elevation of temperature in infants and children may be due to slight causes but should never be disregarded. Fever is an indication for rest and careful watching, and in an acute attack food should be reduced or entirely withheld.

TAKING TEMPERATURE BY RECTUM.

Fever due to indigestion from over or improper feeding is not uncommon, while on the other hand insufficient food may cause elevation of temperature known as "inanition fever." When due to indigestion, fever may be relieved by removing the offending material by means of a brisk cathartic (castor oil), or copious enema, or both. Inanition fever calls for *nourishment.*

A daily rise in temperature of from 2 to 4 degrees long continued, especially in the evening, is suggestive of tuberculosis.

Sponging

A continued fever or a daily rise in temperature demands medical advice. Feverish conditions may be greatly allayed by tepid sponging or the cool bath.

NERVOUS DISORDERS

An excitable condition called nervousness is usually due to unbalanced nutrition or insufficient rest. Inheritance may exert an influence as a remote or predisposing cause and the "nervous temperament" has long been recognized.

Exciting Causes

Among the exciting causes may be mentioned fatigue, indigestion, foreign bodies in the digestive tract, as worms; local irritations which by reflex action disturb nerve equilibrium, as disorders of the genitals, irritable bladder, constipation, seat worms; inflammation of the middle ear; growths in the naso-pharynx; eye strain; skin eruption as eczema, etc. Also improper clothing which occasions unequal temperature or discomfort.

Some of the manifestations are seen in disturbed sleep, grinding of teeth, bad dreams, night terrors, muscular twitchings, chorea (Saint Vitus's dance), convulsions or epilepsy.

Symptoms of Nervousness

Some of the minor symptoms appear as fidgeting, squirming, grimacing, blinking, chewing, nail biting, head scratching, picking at the nose, bed wetting and ready crying, which to the experienced eye proclaim some nerve irritation.

Children should rarely be punished but rather fed for the correction of these involuntary manifestations of nervousness. The wise parent will always consult the physician in these cases.

CONVULSIONS, SPASMS, FITS, CRAMPS

In the category of infantile disorders nothing is more dreaded and no childhood ailment demands greater presence of mind on the part of the mother. It has frequently been stated that children rarely die of spasms, that is, the convulsion of itself rarely kills. Spasms do not constitute the disease, but are only symptoms of some disorder which disturbs the equilibrium of the nervous system.

Cause of Convulsions

We have seen that *reflex action* was highly developed at birth and that *inhibition* (control) was a function of later development. The younger the infant the greater the likelihood of muscular contractions being excited beyond control of the feeble inhibition. Therefore anything which powerfully excites muscular contraction may induce convulsions in infants and young children.

Hyper-excitability and feeble inhibition are also to a certain extent hereditary. The so-called nervous constitution finds its best expression in this want of balance between excitability and inhibition. Nutrition also plays an important part in determining the balance between these two functions of the nervous system (see Rickets). What might be a very trifling disturbance in the adult may induce convulsions in the infant. Again spasms may be one of the symptoms of a very grave disease. It is the *cause* of the fits, then, that is of paramount importance.

From the above may be seen some of the reasons why spasms are frequently among the terminal symptoms of a fatal disease, so that death, *not of* but *in* convulsions, is not infrequent in young infants.

Among the various causes are the onset of some severe illness as scarlet fever, pneumonia, brain disease, etc., or convulsions may be induced by indigestion, constipation, intestinal worms, high fever, very hot weather, severe pain or fright. The ordinary chill in the adult may be expressed by a spasm in the infant.

Symptoms

The symptoms of a spasm may be so slight as almost to escape notice, such as transient eye squint, turning in of the thumbs or great toe, slight muscular twitchings of the face or jerking of the trunk muscles. These evidences of so-called "internal spasms" may pass away or may prove the beginning of violent convulsions, hence should not be disregarded.

General convulsions involve nearly all the muscles of the head, trunk and limbs. Usually there is a peculiar choking sound in the throat; the twitching features become set; the eyes fixed and staring, crossed or rolled upwards, showing only the whites, the body becomes rigid with the back arched, the hands clenched and arms flexed, the jaws firmly closed and if teeth be present the tongue is usually bitten. The face becomes blue from suspended respiration.

This rigidity usually lasts but a few seconds and the child begins to jerk violently with rhythmic motions in arms, legs and trunk. An unnatural audible sound

sometimes occurs with the breathing and the free flow of saliva may be churned into a froth which clings to the lip. The jerking then becomes less marked and finally ceases and the child soon recovers consciousness and cries or falls asleep from exhaustion. This cycle is usually completed in from one to three minutes, though to the watching parents it may seem many times that.

The attacks may recur at intervals for many hours if the cause is not removed and death has been known to occur apparently from exhaustion.

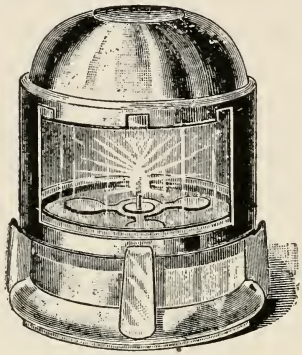
Treatment

Since in infancy one of the commonest causes of convulsions is indigestion or the presence of some irritant in the digestive tract the first thing to be done is to clean out the stomach and bowels. A prompt emetic should be given at once, followed by a dose of castor oil. A copious enema of warm salt solution (teaspoonful of salt to a pint of warm water) should also be given.

For the relief of the immediate spasm the child should be quickly immersed in a hot bath (temperature 110° F. or test with the whole arm) containing a teaspoonful of strong mustard to the gallon, with ice cold cloths to the head. A simpler method of applying moist heat is to wrap the baby in a small blanket or turkish towel wrung out of hot water.

A physician should be at once summoned, but if he is not in reach and the convulsions recur an enema of five grain tablet of sodium bromide dissolved in an

ounce of tepid water may be administered and retained by pressure upon the anus, or half this dose may be given by mouth to a child of 18 months, every two hours if necessary.



A NIGHT LIGHT.

After Effects

Although as stated, death is rarely due to a convulsive seizure, it is none the less to be dreaded, and all means should be employed to ward off its recurrence, for the reason that severe spasms, from whatever cause, may result in permanent injury to the delicate tissues of the brain, among the results of which may be paralysis, with mental impairment.

CONTAGIOUS DISEASES

Source of Infection

Contagious diseases are those due to germs carried to the individual from some other person suffering from that disease. These germs may come through direct contact or may be brought by air, water, food, clothing, books, papers, letters, etc., so that the source from which the child is exposed is often difficult to trace.

Of the contagious diseases we will consider only those most commonly found in infancy and childhood, viz., measles, scarlet fever, chicken-pox, diphtheria and whooping cough. They have a common resemblance in that they have a stage of incubation (the interval from exposure to the first symptoms), all are self limiting diseases (run out their course), all are accompanied by more or less fever, one attack usually immunes from a second (except in diphtheria), each has the characteristic skin eruptions (except diphtheria and whooping cough), and each has its stage of invasion (the interval between the first symptoms and the appearance of the characteristic symptom).

MEASLES

Eruptive Fevers

Measles, German measles, scarlet fever and chicken-pox are called the "eruptive fevers."

Measles is the most frequent and most contagious, attacking all ages and is most prevalent in the winter season. It is contagious during stages of incubation, probably from the breath of the patient, and is rarely carried by a third person. Though lightly regarded

by most people, measles is a very serious disease, especially in delicate children, where it may prove fatal from the broncho-pneumonia or tuberculosis which frequently follows it.

Symptoms of Measles

The attack begins with the symptoms of a bad cold; eyes red, nose wet, fever, hoarseness, sneezing and cough, with slight sore throat, coated tongue and feverish breath. About the fourth day the rash appears, first on the face, gradually spreading downward over the trunk and limbs, which it usually covers in twenty-four hours. This consists of dusky red, slightly elevated, flattened papules, from wheat grain to split pea in size. On the face and trunk, especially, they run together, giving a blotchy look to the dark red with little spaces of normal skin between. The rash period is less than a week and fades away gradually.

The eyes may be very troublesome and permanent impairment often follows. The cough may increase with symptoms of pneumonia. The fever, in uncomplicated cases, subsides with the rash, which is followed by a falling off of fine branny scales continuing during the week of convalescence. *Treatment:* Call a doctor, avoid bright light and put child to bed in a warm room.

GERMAN MEASLES (ROETHELN)

A milder disease than measles, for which it is frequently mistaken. It generally comes in epidemic form in the winter season. The rash appears on the second day, first on the face in pale rose spots slightly

elevated, size of pin head, which usually remain separate. When they do run together they do not form blotches like measles but rather a continuous redness like scarlet fever, for which it is sometimes mistaken. The rash spreads downward rapidly over the body, at the same time beginning to fade from the face so that in three days it has disappeared. The fever is slight, with a little sore throat and wet eyes and nose. Usually small scales from the outer skin fall off a few days after the rash.

Treatment: Protect from broncho-pneumonia by keeping in bed on light diet.

SCARLET FEVER (SCARLETINA)

Scarlet fever is very common at all ages above six months. Occurs most frequently in Autumn (after schools open) and is very contagious. The germs may be carried in clothing and may live for a year stowed away in clothes and bedding.

Virulence

The disease may be so mild as to be overlooked or so severe as to destroy life in 24 hours. The mildest case may furnish germs for one of the severest type, hence the importance of recognizing and isolating every case. It usually comes on suddenly with vomiting. High fever appears on the first day and rash on the second. Eruption first appears on the neck and spreads rapidly over the body and limbs but usually spares the face. The color is uniformly scarlet in typical cases with pin points of intense red showing through. The throat is red and sore from the begin-

ning of invasion and may develop a whitish membrane like diphtheria. The tongue, at first white coated with red points showing through, cleans off so that by the third or fourth day it has the glistening red raspberry appearance, called "strawberry tongue."

Duration

The fever lasts a week or ten days, the rash from five to eight days. A mild attack may suddenly develop alarming symptoms and may be followed by ear disease, enlarged glands of the neck, rheumatism, heart disease or Bright's disease. The latter after 2 or 3 weeks. *Treatment:* Isolate the child and send for the doctor.

CHICKEN POX (VARICELLA)

Chicken pox is very common. Limited to no age, and may be carried by a third person. Onset mild. Frequently the first symptom is the eruption of small rose colored spots on neck and trunk, which change in a few hours to little blisters about the size of a split pea or larger, filled with water. These stand out prominently, having a narrow red ring around their base. There may be a thousand or only ten at one time on the entire body. The blisters dry down and scab, and another crop appears so that spots, blisters and scabs may all be present at once.

About a week terminates the eruption and the child gets well. Scabs should not be picked off, as pock marks will result. Large blisters on the face should be pricked and treated by the physician to prevent pitting.

DIPHTHERIA

Before the use of antitoxin this was an extremely fatal and is even now a dread disease. No age is exempt, though it is rarely seen in very young infants. It is most prevalent in damp weather when sore throats are common and may develop in any sore throat or catarrhal nose or larynx. In the latter situation it is known as "diphtheritic croup," a most dangerous form, for, added to the blood infection we have the danger of suffocation from laryngeal obstruction. In this complication it is often necessary to introduce a tube that the child may get air.

The germs of diphtheria may be carried long distances and maintain their infective properties for months. Hence the utmost care must be observed to isolate the child and destroy all secretions from throat and nose. One attack does not prevent, but rather favors, subsequent infection.

Symptoms

The stage of invasion is marked by feverishness, loss of appetite, debility and sore throat. The reddened throat may show one or more whitish patches on one or both tonsils. Next day both tonsils and soft palate may be covered with a thick, greyish white membrane which may invade the naso-pharynx and cause discharge from the nose. The breath is fetid and the glands under the angle of the jaws may swell enormously. No disease of brief duration causes such muscular weakness as diphtheria, and some cases of death from heart failure occur after the child is over the disease itself.

Treatment: Prompt and strict isolation and most rigid observance of the physician's orders. The acute stage of this disease rarely lasts more than a week.

WHOOPING COUGH

Most commonly seen in young children and infants. It is highly contagious and is seen at all seasons of the year. It usually comes through direct exposure. The mistaken idea that whooping cough is not a dangerous disease has cost many lives.

Onset The onset is gradual, the stage of invasion lasting from one to three weeks as a mild bronchitis before the characteristic whoop is heard. Some children do not whoop, which is merely the effect of forcible inspiration after a prolonged paroxysm of coughing. In that case the nature of the affection must be determined by the paroxysmal character of the cough, which recurs after intervals of one to three hours, and usually ends in gagging and spitting up sticky phlegm from the throat, or vomiting the contents of the stomach without nausea.

Between paroxysms the child may appear in usual health and spirits. The cough is worse at night. Much food is lost in vomiting and nutrition suffers. The younger the child the more dangerous the disease.

Duration Whooping cough covers about two months. A longer continuance is usually due to the bronchitis which complicates it. The complication may be severe and sometimes fatal in infants. Lowered nutrition is quite serious, and feeding should follow rather

than precede the paroxysm to secure retention of the food which must be liquid for prompt absorption.

Treatment: Broncho-pneumonia and tuberculosis are important sequelæ. The best of medical supervision is due in each case but probably nothing is more important than abundance of *fresh air.*

FOREIGN BODIES

Bulky Food

The swallowing of foreign bodies that are not poisonous need cause no alarm or special anxiety, as the bowel will usually discharge the body in a few days. Its passage may be facilitated and the stomach and bowels protected from injury by copious feeding with mush and milk or bread stuffs. As sometimes the object lodges in the narrowing portion of the oesophagus near its upper end, from which it may be recovered by means of curved forceps, the physician should be consulted, or an X ray examination had to determine its location. If the child be choked by a foreign body in the throat, suspension head downward with slapping on the back may cause its ejection.

Use of Syringe

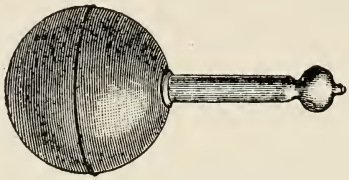
In the Ear. A foreign body in the ear which can not be dislodged by syringing the ear with warm water should be sent to the physician. The body itself is harmless if no clumsy attempts at extraction be made.

An insect in the ear should be drowned in sweet oil and later washed out with a syringe.

In the Nose. A body in the nose that can not be dislodged by blowing the nose or by sneezing should be sent at once to the specialist, as unskilled attempts at removal are usually mischievous.

EARACHE

Earache may be the first intimation of an inflammation of the middle ear. The screaming infant may sometimes pull his hair or put his hand to the affected side of the head. Gentle pressure with the thumb in front of or behind the ear may cause flinching from tenderness. After pus has formed its pressure will usually rupture the drum membrane and allow a discharge through the external passage. Inflammation of the middle ear is usually due to infection from the throat or naso-pharynx through the tube (eustachian) which connects the two cavities. Acute congestion of



RUBBER EAR SYRINGE.

the ear with intense pain is sometimes the result of exposure to cold or drafts and may be relieved by hot applications as salt or water bag. The infected ear may be gently filled with hot water or warm sweet oil, care being taken not to burn.

Danger of Meningitis

So great harm results from neglected ear trouble that the best medical advice should be obtained upon the appearance of the first symptoms. Aside from pain and danger of impaired hearing from formation of pus in the middle ear it should be remembered that

this cavity is in close relation to that containing the brain, and frequent death in infants and children from brain fever (meningitis) is the direct result of infection by this route.

The relation of meningitis in children to the neglected nose, throat and ear, is a very intimate one.

Table of Diseases

The following table shows briefly a few of the typical points of resemblance and difference between these six most common contagious diseases. It frequently occurs that the disease so differs from the accepted type, that its recognition is extremely difficult, requiring a careful consideration of symptoms and conditions, the enumeration of which is impracticable. In all cases the early summoning of the family physician is urged.

Table of Contagious Diseases.

DISEASE	From Exposure to First Symptoms	Day of Characteristic Symptoms	Characteristic Symptoms by which the Disease is Recognized.	Other Principal Symptoms	Duration of Disease from First Symptoms	Important After Effects
Measles (Bubeola	12 to 14 days	4th day	Dusky red spots, slightly elevated beginning on face and spreading over body.	Starts with red eyes, wet nose, and cough with hoarseness.	7 to 10 days	Broncho-Pneumonia, Tuberculosis, Diarrhoea Diseases, Eye Disease Ear Disease.
German Measles (Rotheln)	7 to 21 days	1st day	Bright pink spots or papules beginning on face and extending rapidly over body	Slight fever and but little indisposition.	3 to 4 days	Rarely any.
Scarlet Fever (Scarletina)	2 to 7 days	2nd day	Continuous bright red rash, extending from neck downwards over trunk and limbs.	Starts with sore throat, vomiting (or convulsions) and high fever; later itching and feeling of skin.	7 to 10 days or longer	Ear Disease, Heart Disease, Gland Disease, Anarmia, Bright's Disease.
Chicken Pox (Varicella)	12 to 16 days	1st day	Scattered blisters on face and body, from grain of wheat to split pea in size.	A very little fever.	5 to 7 days	Nothing but pock marks.
Diphtheria	2 to 10 days	1st or 2nd day	Greyish white membrane on throat or hidden behind the palate or in the Larynx.	Slight fever, debility, sore throat, croupy cough, or discharge from the nose enlarged neck glands	1 to 2 weeks	Ear, Nose, or Throat Diseases. Kidney Disease. Paralysis of Soft Palate and Sudden Death.
Whooping-Cough (Pertussis)	7 to 14 days	2nd week	Recurrent prolonged paroxysms of cough (with or without whoop) ferminating in gagging or vomiting.	Vomiting after cough.	6 to 12 weeks	Bronchitis, Broncho-Pneumonia, Pulmonary, Phthisis.

UNIVERSITY OF CALIFORNIA

THE MEDICINE CHEST

Hygiene Not Medicine

A little learning is a dangerous thing, so too is a razor in the hands of a child. Much more harm may follow the unskilled use of drugs than from their neglect. Pernicious as is constant "doping" for the adult, it is much more so for the child. A complicated medicine chest may become a source of endless mischief in the household. "If it does no good it can not do any harm" may be said of nothing possessed of any potency for either good or evil. The following is a brief list of remedial agents for the nursery:

Alcohol.

Alboline (or Lavoline) for daily use in the atomization of nose and throat. In nasal catarrh a physician will give a prescription for a medicated aboline.

Boric Acid. A solution of a tablespoonful to a pint of boiling water, cooled and strained through gauze into a sterilized bottle, may be used as a gargle or wherever a mild antiseptic wash is needed—cuts, bruises, etc.

Bicarbonate of Sodium.

Brandy.

Bromide of Sodium—In five grain tablets, for convulsions.

Castor oil—the most effective and least harmful cathartic. Usual dose, 2 to 6 months, 1 teaspoonful of castor oil and sweet oil mixed; under 2 months, half the amount of the mixture; up to 1 year, about 1 teaspoonful of castor oil; 1 to 4 years, 1½ to 2 teaspoonfuls or more, according to susceptibility. To a child old enough to find the taste objectionable the castor oil may be given in a little warm milk or coffee and milk, followed by more milk, lemonade or peppermint candy.

Ipecac, Syrup of.—As an emetic give a year old baby ½ teaspoonful, followed by drink of warm water. Repeat dose every 15 minutes until vomiting.
Lime Water.
Mustard.
Peppermint, Essence of.
Sweet oil.
Vaseline.

Absorbent Cotton, antiseptic.
Adhesive Plaster.
Alboline Atomizer (Constructed to spray oils).
Ear and Nose Syringe. (Soft rubber.)
Fountain Springe.
Flexible rubber Catheter, number 10 (for rectal tube).
Gauze, antiseptic.
Hot water bottle.

More Care Not Less

Getting the baby out of arms should not diminish the mother's care, but the same protection as given in the nursery should extend throughout childhood, with such modifications as the changing anatomy and physiology demand. In fact, the child of two or three years should receive more of her time and thought than the younger babe, for it is now that his training in personal hygiene should begin and habits of personal cleanliness be established. After infancy, the danger from death may be lessened but not of perverted development.

The fact that a child is able to dress himself does not relieve the mother of the responsibility of seeing that he is properly clothed, and even though he is old enough to sit at the family table, especial attention must still be given to his diet and manner of eating. Thorough mastication is a most important feature of the child's early training and he should not be allowed to "wash down" his food. He should eat some foods requiring vigorous mastication, such as toast and hard cracker, to help in developing strong teeth.

Care of the Teeth

Too frequently the temporary teeth are neglected both as to personal and dental care under the mistaken impression that their early loss renders them of little importance. Even were this true (which it is not) the health and comfort of the child would suggest that they be kept clean and in perfect condition as long

as they remain. To accomplish this end the teeth should be thoroughly brushed and the mouth cleansed with a pleasant antiseptic, such as dilute listerine, borolyptol or glyco-thymoline, night and morning (especially at night) and the slightest decay of the teeth should be referred to the dentist.

Care of the Throat

After a child is taught to properly cleanse his mouth it is but a short step to teach him to gargle and this mastered a little tact and patience on the part of the mother or nurse will soon initiate him into the use of the atomizer and nasal douche, accomplishments which may prove of inestimable value at some critical time.

Every night and morning (oftener if necessary) the nasal passages should be freed from excessive secretion, not only so that the child can breathe through his nose but to get rid of material which harbors infections. The child should early be taught the use of the handkerchief and required to carry his own and impressed with the danger of contact with those soiled by others.

Any tendency to mouth breathing should be immediately corrected and if necessary the advice of a physician sought.

Deep Breathing

Deep breathing should be early taught and insisted upon until it becomes a firmly established habit. This cannot be accomplished with unsuitable clothing or without correct postures in standing, sitting and walking. Frequent exercise in the open air, such as taking a deep inspiration while five, ten or even fifteen sec-

onds are being counted, may be made a game of competition.

Sleep

The need of plenty of sleep throughout the entire developing period can not be unduly emphasized and to this end quiet, well ventilated chambers and individual beds are necessary.

Young children should retire soon after the light supper. Studying, playing or reading by artificial light may interfere with the rest and recuperation required after the fatigue of the day.

Bathing

The frequency, duration and temperature of the bath should depend upon the reactionary effects upon the child. A cold tonic shower bath is best given in the morning and should not last more than half a minute. The child should stand in warm water which covers his feet and be gently sprayed with warm water before turning on the cold shower. If a shower bath is not available, a quick sponge with tepid to cold water with a brisk toweling may be given. The advisability of the cold baths should be decided by the family physician, as all children should not take them. The warm bath may be given before retiring if sufficient time be allowed for the digestion of the supper. General bathing should never immediately follow a meal.

EDUCATION

Childhood is recognized as the playtime of life and most of the plays of children are educational in their tendency. That physical development and training

should take precedence of the mental is self-evident to all who witness the sad spectacle of an over-trained mind in a feeble body.

Games for Girls

In childhood, at least, girls should share the outdoor sports of their brothers. There is no reason why the pleasurable and useful exercise of running, jumping, swimming, rowing, skating, riding, cycling and most games should be confined to boys. The cry of "tom-boy" has deprived many a girl of the physical foundation for the duties and responsibilities of mature womanhood.

Rousseau says, and truly, the weaker the body is, the more it commands; the stronger it is, the more it obeys.

"A well-trained nervous system is the greatest friend that the mind can have."—*Halleck.*

The country affords special advantages for the normal development of the child, for here it is that he comes close to nature which furnishes innumerable object lessons and problems which his inherent curiosity impels him to solve. Thus he is led to develop himself through a symmetrical training of muscles and brain. For the city child, these conditions should be approximated as nearly as possible.

Development of the Brain

The brain, relatively large, even at birth, is susceptible of very rapid development. If, however, this be allowed to exceed that of the muscles, irreparable damage may result and mediocrity take the place of early precocity through early exhaustion of the brain cells from over stimulation. It must never be forgotten

that young nerve cells tire quickly, not yet having the stored energy of maturity.

The younger the child the more should the early educational efforts be restricted to the larger groups of muscles,—leg, arm and body exercise rather than those of the fingers and smaller groups of muscles which require concentrated efforts at finer co-ordination. The use of the needle, pencil, brush and scissors may well be deferred and replaced by romping games, efforts at house building with large blocks or shovel and sand pile.

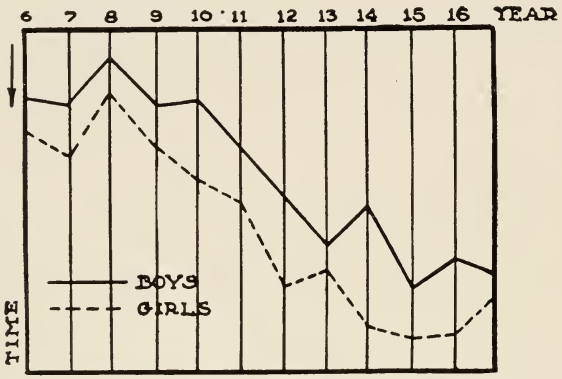
Period of Weak Heart

The proverbial laziness of the boy of eight years is based upon a physiological fact which is too frequently overlooked. His heart at this time has not kept up with the rapid growth in body length and is barely able to maintain the circulation of the blood for ordinary mental and muscular exertion. He is least fitted at this time for the extra demands made upon him for running errands and doing all sorts of chores which he usually does clumsily and tardily because of excessive fatigue. Many boys and girls are stunted for life or succumb to infectious disease from excessive burdens imposed during this period of weak heart, namely, from the eighth to the twelfth year.

Limit of Attention

It has been shown often that the purpose of our so-called educational systems has been defeated by ignorance of the child's capacity for concentrative attention to a given subject. Fifteen minutes is about the limit for a child between five and seven years of age

and the grammar school pupils rarely show a capacity for more than thirty minutes of uninterrupted study. This power may be even further reduced by debilitating conditions, such as improper food, impaired digestion, physical fatigue, insufficient sleep or vitiated air of the school room.



Krohn's Diagram Representing Relative Time of Fatigue at Different Ages.

Eye and Ear Strain

Early exhaustion of nerve force is frequently increased by eye strain from defective vision and pupils often appear dull at school because they can not see distinctly maps, charts or blackboard exercises. In the same category as a cause of apparent mental dullness is defective hearing,—the words of the teacher failing to make a definite impression upon the child's sensorium, with resultant confusion of ideas. In this respect a grave responsibility rests upon parents and teachers. The oculist and aurist should be frequently

consulted and any defects in these "avenues to the mind" corrected.

School Hygiene

The subject of school-room hygiene is too broad to receive more than passing mention here. The parent should visit the schools and satisfy himself as to the heating and ventilation of the rooms in which his children spend so many hours. The seating with reference to light and vision, adaptation of seat and desk to the size of the child so that undue fatigue or actual deformity may be obviated, should also be given consideration. Is there a judicious alternation between mental concentration and free-limbed exercise suitable to the child's age?

PUBESCENCE

Pubescence is a period of the greatest importance in the development of the child, not only physically but mentally and morally.

Changes in the Girl

The rounding out of the girl's physique with broadening of the hips and rapid growth of the breasts suggests the approach of menstral function. This should *never* be allowed to take the little maiden by surprise, but the mother should have prepared her daughter's mind for this sign of womanhood. Unfortunate is the girl whose mother has not had the tact and courage to instruct her beforehand concerning the true meaning of conception, gestation and motherhood. Many lives have been lost or ruined because the mother has failed in her duty in this respect.

Probably the best argument for the early study of

biology, including botany, is the natural introduction thus afforded to the great mysteries of ovulation, fructification, conception, gestation and parturition and the true physical relation of the sexes in the great plan of life. There is nothing to shock the modesty of the normal girl if these subjects are properly approached along the lines of comparative biology.

Care

The pubescent girl's periodical indisposition should be recognized and guarded from undue burdens and responsibilities, as the foundation for future suffering and disease is often laid at this time. The woman is fortunate whose pubescent life escaped the crippling effect of tight or high-heeled shoes, whose anatomy has not been distorted and generative organs disarranged by the corset, and whose moral and social education has followed natural family and domestic lines rather than the artificialities of the so-called modern society.

Wholesome companions and literature, out-of-door exercises and amusements with reasonable domestic responsibilities should alternate with judicious selection of musical, physical and literary curriculum in well-selected schools.

The judicious parent will endeavor to teach the pubescent boy *manliness* rather than mannishness, and to inculcate early reverence and respect for pure womanhood. He should have the companionship of pure-minded girls.

The Boy

The boy ought to be taught by a senior whom he re-

veres (preferably his father) the true meaning of sex differentiation and sexual passion. It should be clearly shown him that venereal disease with its far-reaching baneful effects lurks ever as the penalty for licentiousness. He should be given to understand that an occasional seminal emission while sleeping is no more sinful than a transient hemorrhage from overcharged blood vessels or vomiting for an overloaded stomach. Above all, he should be taught to respect his own body.

Here again competitive athletic sports, good literature, the study of natural sciences with abundance of out-door life will lead the boy away from tendencies toward immorality and dissipation.

Physical Development Most Important

Close confinement to books and literature too frequently causes physical and mental collapse during pubescence, for which the prizes for scholarship are not infrequently responsible. Plenty of fresh air both day and night and the daily cold bath are items of tremendous value in the hygiene of pubescence. Emphasis and encouragement to physical development should be given by the parent at this time (and at all times). Better take the boy or girl out of school for a term or two, if necessary, than to harm his body for life. Book learning can easily be made up, but perverted physical development often can never be rectified.

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Century Book for Mothers ($2.00, postage .18). Yale and Pollock.

Development of the Child ($1.25, postage .12). N. Oppenheim, M. D.

Hygiene of the Nursery ($1.00, postage .08). Louis Starr.

Theory and Practice of Infant Feeding ($2.25, postage .20). Henry Dwight Chapin, M. D.

Food and Principles of Dietetics ($3.00, postage .26). Robt. Hutchison, M. D. Chapters 24, 25, 26.

School Hygiene (For teachers) ($1.00, postage .10). Edward R. Shaw.

Medical Books

Diseases of Children ($3.50). A. C. Cotton, M. D.

Pediatrics—Hygiene and Medical Treatment of Children ($6.00). T. M. Rotch, M. D.

Diseases of Infancy and Childhood ($6.00). L. E. Holt, M. D.

TEST QUESTIONS

The following questions constitute the "written recitation" which the regular members of the A. S. H. E. answer in writing and send in for the correction and comment of the instructor. They are intended to emphasize and fix in the memory the most important points in the lesson.

CARE OF CHILDREN

PART III

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. Leave space between the answers for the notes of the instructor. *Answer every question fully.* Read the lesson paper a number of times before attempting to answer the questions.

1. Does crying benefit the baby? If so, how?
2. Describe different cries and give their interpretation.
3. What do you understand by nervousness in a child?
4. Name some causes for nervousness and the symptoms.
5. (a) What does fever indicate in an infant?
   (b) What may be done for its relief?
6. (a) What is an ordinary cold?
   (b) Why is no cold trivial?
7. Give the cause of sore throat.
8. (a) What is the "anarchist's den"?
   (b) How may it be cared for?
9. What contagious diseases are the most dangerous and why?
10. Mention the possible after effects of measles, of scarlet fever.
11. What causes convulsions? Why are they to be dreaded?
12. What should be done for their immediate relief? What for their prevention?

13. Mention two important items in the care of whooping cough?

14. Why should a physician be called immediately in a case of suspected contagious disease?

15. How may scurvy be prevented?

16. What is rachitis? How may it be prevented?

17. What are the dangers of a discharging ear?

18. How would you guard the baby against summer complaint?

19. What can you say as to treatment for constipation?

20. What is the aim of education?

21. What to you are the most important points in the hygiene of the school child?

22. Pubescence,—what does it mean in the life of the boy and girl?

23. What questions have you to ask?

Note—After completing the test, sign your full name.

SODIUM CITRATE IN INFANT FEEDING*

By A. C. Cotton, M. D.

The infant deprived of the breast must, in relation to his feeding, be regarded as a pathologic problem. That this statement is axiomatic is shown by the fact that more earnest work has been bestowed on infant feeding during the past twenty years than on all other pediatric subjects combined. That the problem is still unsolved the high relative mortality and later morbidity (illness) of artificially fed infants bear constant witness.

The six essentials of Cheadle, enunciated by that observer some time in the '80's, bear witness that the essential requirements of an artificial food for babies were broadly understood twenty years ago. Quoting from memory, they are briefly as follows: 1. Sterility. 2. Antiscorbutic property. 3. Quantity. 4. Some Animal constituents. 5. Form suitable. 6. Constituency. Much has been learned since Cheadle by amassing clinical results and observations. Meanwhile the deductions from *a priori* reasoning have proven unsatisfactory for the simple reason that so little was known of the physiology of infant digestion. Latterly the premises from which we reasoned have been proven, almost without exception, to be incorrect.

* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-seventh Annual Session, June, 1906. Reprinted from the Journal of the American Medical Association of October 6, 1906.

Thus the great American experiment known as the exact percentage method of feeding required that the baby's diet should consist wholly of cow products and water, so modified in its five gross constituents as to coincide quantitatively with similarly named constituents of average breast milk. One other ingredient only was allowable in this feeding mixture, viz., some alkalin solution, as lime water, sodium bicarbonate, or magnesia. This dogma, which in connection with laboratories established throughout the country had almost become a cult in infant feeding, was practically based on seven assumptions, which have recently been proven erroneous, to wit:

1. The qualitative similarity in breast and cow's milk of the lactose, fats, albuminoids, proteids and their chemical combination with the milk salts.

2. The claimed alkalinity of breast milk in contradistinction to the acidity of cow's milk.

3. The possibility of a synthetical substitute for breast milk from cow products alone.

4. The claim that cereals were not allowable because indigestible in the infant's secretions and that they induced dyspepsia and intoxication by acting as decomposing foreign matter.

5. That cereal gruels were no more efficient in the prevention of dense milk coagula than dilution with plain water.

6. That HCl played no part in the digestive process until later infancy.

7. That the important proteid content of the baby's food could be made up from the non-coagulable whey albumin of cow's milk.

The elucidation of facts in refutation of these premises is due to the earnest work of a number of men, prominent among whom as members of this association may be mentioned Chapin on cereal gruels and gastric development, Kerley on milk reaction and alkalinization, Shaw on HCl secretion in infants, Stern on milk fats, Southworth on the art versus the science of infant feeding, Morse on acidified milk and buttermilk feeding, and the recent unsurpassed work in chemistry of milk by Van Slyke and Hart at Geneva. Most of these contributions have enriched our literature and become familiar to all. The subject is still a broad one. I disclaim any intention of attempting in this limited paper to deal with it *in toto*, and indulge in these preliminary observations merely to emphasize the fact that no royal road to successful feeding by exact mathematical formulas has yet been found. Nor do I wish to convey the impression that I would belittle the value of attempts at accuracy in determining the component parts of the infant's dietary.

Great credit is due and will ever be associated with the name of Dr. Rotch as the founder of a system which has not only served as a hypothesis for tentative feeding, but has stimulated to greater accuracy and more careful clinical observation and recording of results than was possible by any other method.

As an enthusiastic advocate of the so-called American method, I am on record frequently both at home and abroad. I may be pardoned if I suggest that the tendency in general is too much along the line of the refinement of mathematical formulas to the neglect of the obvious importance of gastric development along normal physiologic lines.

The spectacle of a marantic infant with persistent curds in the stools, though cow proteids have been reduced to the extreme limit of attenuation by dilution with water, is a familiar one. So, also, too commonly in evidence is the child, fed long but not nourished, on whey proteids and cream, whose gastric vigor has not progressed beyond that of early infancy.

Important as the rôle of carbohydrates and fats in infant development may be, and difficult as the problem of properly dealing with fats is, it is to the management of the proteids that I beg to call your attention in the few minutes allowed. Their importance in the nutrition of the child needs no emphasis, as it is universally accepted both theroetically and clinically.

The intolerance of the infant's digestive organs to cow proteids, so widely different from those for which they were intended, is also well known. Of the many methods in vogue for the establishment of toleration of these refractory curds the one most common, unfortunately, is their quantitative reduction by dilution far below percentages absolutely necessary for the

development and growth of the child. In fact, the common advice to infant feeders on percentages of milk in recognition of its refractoriness, is either to restrict the proteid percentage far below that which is known to obtain in average breast milk (as though Nature would commit the absurdity of elaborating the necessary amount of proteid from even a less quantity when presented in the more obstinate form of cow casein), or to substitute the non-coagulable proteids of whey.

In either case Nature is cheated of her absolute demands. The pathetic malnutritional results of low proteid feeding, both immediate and remote, are too familiar to us all to need further elaboration. Aside from this slow starvation and stunted growth with its diminished resistance to intercurrent disease from insufficiency of nitrogenous food, abundance of proteids is demanded in a coagulable form for the normal development of the gastric function, as ably shown by Chapin and corroborated by a host of clinical observers. This the infant gets at the mother's breast in proteids which clot on admixture with the gastric contents in soft, flocculent, semi-solid coagula which readily pass the pylorus in a form suitable to intestinal digestion and absorption.

The important question, then, in feeding cow's milk is not how to reduce the proteids and sustain life, but how to *increase* the proteids and *maintain unimpaired digestion.* Buttermilk has been tried:

acidulated milk has been tried; admixture with gruels has been tried; koumiss, matzoon, and kephir milk have been tried; the addition of various alkalies is much in vogue; all with varying degrees of success, and each measure has its ardent advocates. That the question is not yet settled this diversity of opinion amply indicates. It is still an open field, and the cry that no chemical tampering with the milk should be encouraged need deter no one, since it is proven beyond dispute that cow's milk, however modified, is not a natural food for the human infant. The more orthodox observers of the original laboratory percentage modification have from the first chemically tampered with the milk in the addition of lime water, sodium bicarbonate, etc., in the mistaken notion of humanizing the mixture by rendering it alkalin. That we reached further than we intended in our administration of alkalies and secured toleration of the curds through neutralization of the normal gastric acids does not lessen the evils of inhibition of those digestive processes which can occur only in an acid medium.

Since deductive methods from *a priori* reasoning have thus far failed of a satisfactory solution of this problem, let us welcome inductive methods conducted along rational lines, since massed clinical evidence must ever be the tribunal before which all method must come to trial. Whether *secundus artem* or *secundus scientiam*, it is the greatest number of babies

who live and thrive and resist disease that demonstrates the merits of their hygiene.

It is with the firm conviction that sodium citrate, through its inhibition (prevention) of dense coagulation of cow's milk in the presence of an acid and rennin, may prove valuable in the solution of the proteid problem that I present a brief résumé of my experience with this agent.

More than two years ago in a personal letter from one of my assistants, Dr. J. W. Vanderslice, who was studying abroad, my attention was called to this use of sodium citrate. The reports from Dr. F. J. Poynton's clinic at Great Ormond Street, London, from which the writer as an eye witness drew his conclusions, seemed sufficient to justify a careful consideration of this new method of overcoming some of the obstacles in the adaptation of cow's porteids to infant digestion.

Rather cautiously, I began prescribing the citrate in cases in which varying milk mixtures had been used with poor success. Later, as I found that infants would tolerate a larger proportion of the milk in the feeding mixture when citrated, than by any other modification known to me, I used it more boldly, so that during the past two years I find a record of its employment for a longer or shorter period in more than 50 cases in both hospital and private practice. I have here, by the courtesy of Dr. J. D. Merrill, a report of 8 cases in which she has carefully observed

its effects for a considerable time, also, by the courtesy of Dr. Vanderslice, a history of 29 cases reported by him at different times to the Chicago Pediatric Society. In addition to this I have read carefully Dr. Shaw's report of 22 cases, making a total of 112 cases embracing nearly all conditions from simple dyspepsia to marasmus and ranging in age from the new born to adults who have suffered from milk dyspepsia.

Sodium citrate being very soluble in water, the method of employment is simple, as follows: An aqueous solution is ordered containing from 1 to 5 gr. to the dram. A quantity of this solution is furnished the mother or nurse with instructions to add to the baby's bottle immediately before feeding enough of the solution to represent 1, 2, or even 3 gr. of the citrate to each ounce of milk in the feeding mixture, according to the prescriber's idea of the requirements. The feeding mixture may consist of varying dilutions of milk with water or gruel, with the addition of cane or milk sugar, with or without cream. No alkalies are added, the sodium citrate used being a neutral salt. A most noticeable feature in this method of feeding is the large proportion of milk in the feeding mixture that the infant will tolerate without evidence of gastric disturbance or the appearance of any considerable amount of undigested casein in the stools. In fact, the stools of babies fed on citrated milk have come to be regarded by Drs. Merrill, Vanderslice, and myself as positively characteristic, being firm enough

to show form on the diaper, free from fecal odor, and homogeneous in color and consistency. The slight tendency to constipation mentioned by Dr. Vanderslice I have observed in a number of cases. This I attributed to the low percentage of fat in the food consisting of equal parts of milk and water or even one part of milk to two of water. In but few instances have I observed this constipation where the fat content of the mixture equaled 3 per cent.

One indication for the increase of the sodium citrate, even in some cases to as high as 3 gr. to the ounce of milk, is vomiting of curds. Another indication is the appearance of curds in the stools, care being taken to exclude indigestion from excess or intolerance of fats. Of the stools, J. H. Salisbury, professor of chemistry, to whom they were submitted, reports as follows:

Three samples of the feces of infants fed with milk modified by the addition of citrate of sodium were examined. The feces were yellow, of a moderately firm consistence and remarkably homogeneous. On microscopic examination a few round masses, probably calcium soaps, could be seen scattered through the otherwise very fine débris. In two specimens short crystals of soap could be detected. No free fat was found. On treatment with acetic acid more or less acid crystals could be observed and in one specimen this was especially marked. Chemical examination of one specimen for proteids was negative.

The duration of the administration of the sodium citrate, as well as the quantity employed, varies considerably in different cases, the purpose being to

bring the baby's feeding up toward whole milk as rapidly as possible. As toleration is established the amount of citrate is reduced to one, to one half and to one fourth of a grain per ounce of milk until it can be discontinued. It happens not infrequently that the citrate is profitably resumed on the recurrence of signs of indigestion. In but 6 cases have I felt obliged to discontinue the citrated milk and adopt other methods of feeding. Some of these were among my early cases which, if occurring later, would possibly have received a more persistent treatment with citrated milk.

In consideration of this subject three questions naturally arise: 1. Is the employment of sodium citrate any better than other methods of rendering cow proteids tolerable and digestible? 2. Is its employment harmful? 3. In what manner does it act?

In answer to the first I would say that this method seems to allow a more rapid increase in the proportion of milk ingested than any other known to me. Moreover, the frequency of relief from milk indigestion on the addition of the citrate and the favorable reports from all whom I have known to give it a thorough trial are not without significance. In regard to its harmfulness, no case of citrated milk feeding has been brought to my attention in which there appeared to be cause for regret because of the employment of this method.

Concerning its manner of action in a chemical sense, there appears to be some difference of opinion. Professor Salisbury, above quoted, to whom the question was submitted, states as follows:

> Citrate of calcium is insoluble in water, but dissolves readily in solutions of the alkali citrates. It is to be presumed, therefore, that when a solution of sodium citrate is added to milk, which contains calcium in combination with casein, a reaction would occur producing a sodium combination of casein and an insoluble calcium citrate. The latter would dissolve on the addition of an excess of sodium citrate. It is to be presumed, therefore, that the milk treated with citrate of sodium contains a sodium compound of casein and calcium citrate held in solution by the presence of sodium citrate. Such milk would not yield a curd containing an excess of calcium, but the calcium would be found in the whey as well as in the curd. The experiments of Dr. R. Aibinder do not contradict the theory of Poynton that sodium citrate acts by separating the calcium from the casein, thus rendering it less easily coagulable. Sodium citrate would react with hydrochloric acid solution to form sodium chlorid and citric acid. The decomposition would not be complete but so nearly so that a large quantity of sodium citrate would neutralize nearly all the free hydrochloric acid of the gastric juice. Too large an amount of sodium citrate in the milk might, therefore, interfere with the digestion of proteids in the stomach. Such digestion might occur in the intestine from the action of the pancreatic juice.

The physical behavior of citrated milk *in vitro*, outside the body, is obvious and may be demonstrated in a simple manner suggested by Wright and Poynton, who first exploited this method of feeding. Into each of two test tubes containing equal quantities of

milk (to one of which sodium citrate has been added) drop a given quantity of liquid rennet and dilute hydrochloric acid. In both milks coagulation occurs, with this difference, that the citrated milk clots less promptly and the resultant curd is softer, less dense, more nearly resembling the curd of breast milk.

My assistant, Dr. F. W. Allin, as the result of more than a hundred careful comparisons, has obtained the following results:

Materials Used.—Ordinary dairy milk was used in these experiments. Wyeth's liquid rennet was used for curdling agent, which was always added last. A 1 per cent hydrochloric acid solution and 4 per cent sodium citrate solution were used. Two drops of HCl in 5 c.c. milk equals .025 per cent. Five drops of sodium citrate solution equals .25 per cent. One grain of sodium citrate to the ounce of milk would be .20 per cent. The gruels were standardized to one ounce of flour or oatmeal to the quart of water and cooked three hours in a double boiler.

Conditions.—The experiments were all performed at 40 C. in glass test tubes. The milk was used as whole milk or diluted with water, flour gruel, or oatmeal gruel. The dilutions made were two thirds, one half, one third, one fourth, one eighth milk.

* * * * * * *

CONCLUSIONS

1. Sodium citrate in 25 per cent, or more, retards, and very high percentages will inhibit coagulation.

2. The presence of HCl hastens coagulation.

3. Diluting milk generally retards coagulation.

4. Gruels appear to have little or no effect in retarding coagulation more than water when the the citrate is used.

5. The coagula of citrated milk are softer, smoother, and more jelly-like or more flocculent than those of milk not thus treated.

The simplicity of this method commends itself, especially in dispensary and out-patient practice, where the mother's demand for "medicine" for the baby's dyspepsia may be met by the standard solution of sodium citrate to be administered in teaspoonful dose in each bottle of the feeding mixture. In private practice it furnishes another rational method of infant feeding.

1485 Jackson Boulevard, Chicago.

Editor's Note. This article, intended for physicians, is included here *only* to inform mothers and nurses of the latest and seemingly, a very important development in the artificial feeding of infants. It is obvious that this new method should be tried only under the direction of the attending physician.

Sodium citrate is made by neutralizing citric acid with soda Citric acid is the acid found in lemons, oranges, and some other fruits. As stated, sodium citrate unites with some of the lime (calcium) compounds which make the clots of cow's milk more dense than those of mother's milk.

THE SOOTHER*

By A. C. Cotton, M.D.

In these days, the inalienable right of a child to protection, especially during the helpless period of infancy, no thoughtful physician questions. Even the lay mind seems to have grasped the idea that the infant should be guarded against all influences detrimental to his normal growth and development.

It is well recognized that one of the commonest causes of infant mortality and morbidity is to be found in disturbances of the digestive tract. That these disturbances are commonly due to infections is generally admitted. Much is yet to be learned in regard to the exact nature of these infections, but all observers seem to agree upon two principal sources of infection, viz., exogenous and endogenous. In the majority of cases of gastro-intestinal disturbance it is not easy to differentiate between these two sources. The term "Autointoxication" is frequently heard as an explanation of gastro-enteric infection in many instances in which the source of the infective material is in doubt. Enough is known however, both from clinical observation and bacterial demonstration, that food infection, especially among nurslings, is the most frequent cause of their disorders; hence the recent revival of interest in the

*Reprinted from the Medical Brief, September, 1904.

milk supply and methods of handling the same, also in the means of protection from germs which might prove detrimental to the quality of the milk or injurious to the digestive apparatus of the infant. Pasteurization, and even sterilization, though undoubtedly depreciating the food value of the milk as well as its digestibility, are advocated by many who would minimize the danger from the introduction of pathogenic micro-organisms with the food. For the same reason, the improved hygiene, including the care of the nursing bottle, the sterilization of the nipple, the antiseptic care of the baby's mouth, and everything pertaining to the act or process of feeding, is widely practiced.

The unanimity of the profession in regard to these details leads the writer to call attention to a glaring inconsistency in infant hygiene, which is so widespread as to come under the daily observation of every baby feeder. The long-tube nursing bottle is practically obsolete; indeed, some municipalities have enacted laws against the sale or use, for the evident reason which has been amply demonstrated — that the apparatus can not be kept germ-free. Great cedit is due to Doctor Ernest Mende, of Buffalo, for his vigorous and successful crusade against this death-dealing tube. As though the nursling had not enough to contend with in securing his right to protection in our unhygienic homes, it would seem

that saturnine ingenuity were invoked to devise methods to introduce pathogenic micro-organisms into his very vulnerable digestive tract.

Such an ingenious device I now refer to, as the "soother" conspicuously displayed for sale at all shops. So popular with the laity is this devilish invention that mothers and grandmothers wantonly teach the baby its use, and have been known to express regret when the infant did not take to it kindly, because it appeared to be such a comforting habit when once established.

Upon examination of the construction of this so-called "soother" and its method of employment, it is evident that no apparatus could be constructed to furnish a better medium for the collection and cultivation of a great variety of organisms, many of which are undoubtedly pathogenic to the nursling. Warmth and moisture are supplied by the baby's mouth and secretions. Germs, everywhere present, are planted upon this culture bed from frequent contact with hands and garments and furniture, floor, ground, and not infrequently, from the mouth of the mother or nurse. The contrivance itself, with its adhesive, retaining surfaces, its constrictions and ridges, its bone shield and stem with their crevices, depressions, and openings, its ornamental ring with fancy ribbon or filthy string by which it is attached to the person of the victim, all perform their part in the cultivation and colonization of

possibly death-dealing microbes. If any one is inclined to question the truthfulness of these statements, let him possess himself of the next "soother" that he meets in active operation, and examine smears from the accumulations in its grooves. His microscope and cultures will convince him of the truth of my statement.

Pernicious as it may be, this daily and hourly ingestion of infective organisms is not the limit of possible injury to the infant through means of the "soother." The subject of adenoid facies, so-called in its relation to the existence of troublesome adenoids, has not escaped the attention of any student of child development. Peculiar conformation of oral and facial structures is commonly—perhaps too commonly—attributed to the presence of the adenoids. That the adenoid face frequently appears as a familiar type is well known, and the etiological relationship of the malformation to the naso-pharyngeal growths is a question not yet settled. That the adenoid face is found with the adenoids, is not proof that the former is due to the latter. That adenoids may cause mouth-breathing is evident. That mouth-breathing causes well-known deformities such as a narrowing of the palate, constriction of the inferior nasal meati, with deflection of the nasal septum, is not so apparent. That mere inspiration and expiration through the mouth will cause, or even greatly influence the oro-nasal con-

formation, the writer does not believe, though he accepts the deformity or any other condition which interferes with free nasal respiration as prolific in the causation of naso-pharyngeal catarrhs, with hypertrophy of adenoid tissue. The direct current inspired in the mouth-breather incites tonsilar hyperemia and hypertrophy, so that the familiar type of this deformity may prove the starting point to the lesions of the mucosa above mentioned.

In the absence of heredity it may be questioned whether intrauterine conditions or pressure at the time of delivery, with or without forceps, may not influence the peculiar conformation known as "congenital adenoid facies." Be that as it may, the fact is well known that an infant apparently normal at birth may gradually develop this oro-naso-facial deformity between the sixth month and the third year of its life. The not uncommon dental deformity produced by thumb sucking has been thoroughly exploited. Little, however, so far as the writer knows, has been said in regard to the effect of the continuous use of the "soother" in this connection. When we recall the plastic condition of the structures that make up the oral and nasal cavities, giving form to the infant face, and remember that ossification is incomplete at birth, proceeding only from numerous ossific centers with intervening areas of plastic tissue, it is not difficult to perceive that persistent,

or continuously remittent pressure applied in the same direction will influence the shape of the structure as ossification proceeds. The modern operations for congenital bony defects, as fissure of the palate, shows how plastic are these palatal and alveolar structures in early infancy. The normal oral cavity in infancy is extremely shallow. The alveolar ridges are low, and do not approximate when the mouth is closed, in which position the tongue fills the entire fossa, pressing lightly against the flat, low-vaulted palate.

The mother's nipple, conical in shape, with proximal base, very compressible, is seized in the act of nursing by the infant's lips, which are exceedingly prehensible in their function, the anterior alveolar ridges being employed to assist the suction in stripping the nipple from base to apex. The milk, which flows freely from the sympathetic breast in response to the nervous mechanism of the mother, is thus easily secured with but little effort on the part of the child, in the line of vacuum formation. To be sure, where the flow is meagre or refractory, the vacuum-forming apparatus with its sucking pads is complete, and may be employed with great energy. In all of this, however, the roof of the mouth is disturbed by little or no pressure, and the child, gratified with the steady flow of delicious aliment, finds but little need for suction sufficient to cause great lateral pressure on the alveolar ridges. Moreover

the act of nursing occupies but a short time, and is followed by hours of rest.

The "soother" resembles the maternal nipple in no respect. Almost without exception it is pear-shaped, the narrow neck emerging from a disc of bone, which, resting against the outside of the flattened lips, prevents the apparatus from being swallowed. This pressure does away with the prehensile function of the lips. The large foreign body, engaged between the tongue and the yielding, plastic roof of the mouth, is mumbled continuously, while frantic efforts at suction to derive milk from this barren apparatus develop the mechanism for vacuum formation to the highest degree. What follows? The powerful buccal muscles with their sucking pads are continuously forced against the lateral alveolar ridges. The upward pressure of this pear-shaped body increases the concavity of the yielding palatal arch, thus favoring the approximation of the superior lateral alveolar ridges. The inferior nasal meati, whose floor is thus uplifted, are diminished in height. The septum nari, buckling under pressure, still further limits the respiratory area of the nose. Moreover, the use of the "soother" becomes practically continuous as the habit develops, so that the mumbling and sucking continues even during the broken slumber. Indeed, it is usually interrupted only long enough for the infant to receive food, and the infernal contrivance to receive

fresh smears of bacteria from the never-failing environmental supply. It is doubtful if this prolific agent of infection and deformity will ever be entirely abolished without legislation prohibiting its manufacture and sale.

1485 Jackson Boul , Chicago

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASSES ON

CARE OF CHILDREN

MEETING I

(Study pages 1–31)

Before Baby Comes.

Care of the Child in Health, Oppenheim, pages 1–46. ($1.25, postage 12c.)

Century Book for Mothers, Yale and Pollock, pages 1–24. ($2.00, postage 18c.)

Care of the Baby, Griffith, pages 17–34. ($1.50, postage 18c.)

The New Born Baby and His Care.

Care of the Baby, pages 34–46; Century Book for Mothers, pages 25–29.

Clothing.

Century Book for Mothers, pages 44–58.

Care of the Baby, pages 86–115.

Exhibit.

(1) Make pattern, cut and finish a "baby bag," as shown on page 23. Contrast this with a typical pinning blanket.

(2) Show simple and tasteful baby's dresses and over elaborate dresses.

(3) Trace the outline of a child's bare foot.

(4) Show good and bad shoes.

MEETING II

(Study pages 32–53)

The Nursery, Sleep, Bathing.

Care of the Baby, pages 213–224, 68–85.

Century Book for Mothers, pages 18–24.

See article on *The Soother* in the Supplement.

Development and Growth

Century Book for Mothers, pages 59–76.

Care of the Baby, pages 46–67.

If possible, show a weight chart for some baby.

(Select answers to the Test Questions on Part I and send them to the School. Report on supplemental reading, etc. for the first two meetings.)

MEETING III

(Study pages 55–75)

Natural Food.

Food and Dietetics, Hutchison, pages 414–427. ($3.00, postage 26c.)

Care of the Baby, Griffith, pages 116–132.

If not familiar with food principles and their use in the body, read Food and Dietetics, Norton (Volume VI, Library of Home Economics), or send to the Department of Agriculture, Washington, D. C., for some of the free bulletins called Farmers' Bulletins: No. 142, Principles of Nutrition and Nutritive Value of Food; No. 42, Facts about Milk; No. 74, Milk as Food; No. 93, Sugar as Food; No. 108, Eggs and their Use as Food, etc.

MEETING IV

(Study pages 75–122)

Artificial Feeding

Care and Feeding of Infants, Holt. (75c. postage 6c.)

Food and Dietetics, Hutchison, pages 428–453. ($3.00. postage 26c.)

See article in the Supplement on *Citrate of Soda in Infant Feeding.*

See Farmer's Bulletin, No. 210, The Covered Milk Pail; No. 227, Clean Milk.

Have a report on the local milk supply as to sanitary condition of dairies, age of milk when delivered, enforcement of local regulations.

Visit a model dairy.

Send for the booklets of the manufacturers of the various "infant foods." Weigh the evidence.

Food for the Second-year and Older Children.

See Food and Dietetics, Norton (Vol. VI of the Library) pages 174–178.

How to Feed Children, Hogan. ($1.00, postage 10c.)

(Send in answers to the Test Questions on Part II and give a report of Meetings III and IV.)

MEETING V

(Study pages 123–164.)

Food Disorders.

Care and Feeding of Infants, Part III.

Century Book for Mothers, pages 124–135; 258–265.

Minor Troubles.

Send 2 cent stamp to the State Board of Health, Springfield, Ill., for their bulletin on "Infant Feeding."

See article on "Soothing Syrups" in Collier's Weekly, April 28, 1906.

Century Book for Mothers, pages 193–218; 233–242.

Children's Diseases.

Care of the Baby, pages 314–336.

Send to the State Board of Health, Lansing, Michigan, for their bulletin on Diphtheria, Scarlet Fever, Whooping Cough, Measles, Meningitis, and Teachers' Bulletin No. 87, "The Milk Problem."

Also send to the Secretary of your own State Board of Health (to the capital city) for any bulletins on contagious diseases.

MEETING VI

(Study pages 165–173.)

Hygiene of the Child and Youth.

Report on the ventilation, heating, lighting, and sanitary care of local schools.

What attention is given to physical education.

Read extracts from "The Medical Inspection of Schools," Lewis S. Somers, M. D. Prize essay, free from the publishers, The Maltine Company, Brooklyn, N. Y. (6c. of the School.)

(Send answers to the Text Questions on Part III and give a report of Meetings V and VI.)

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